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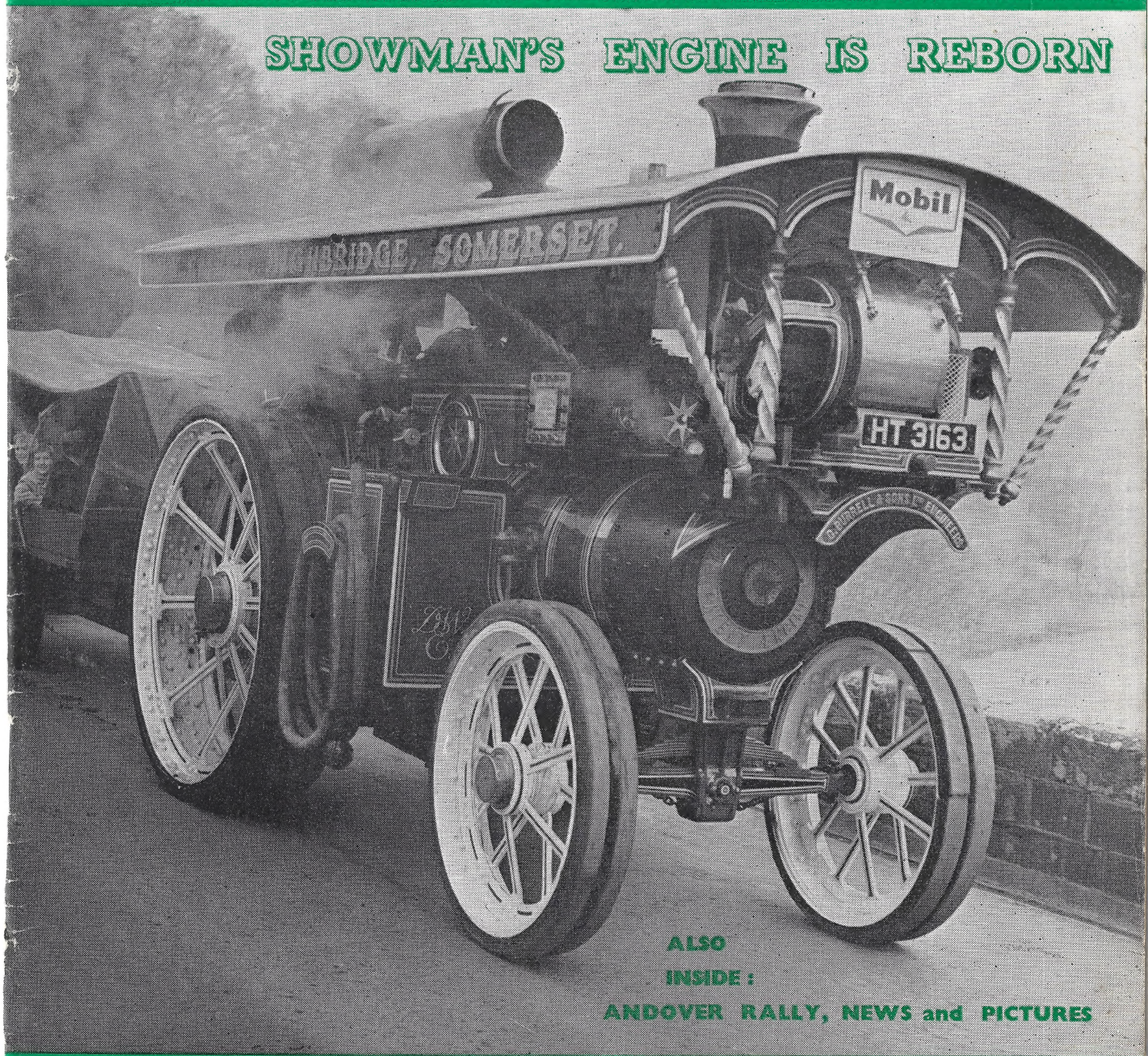

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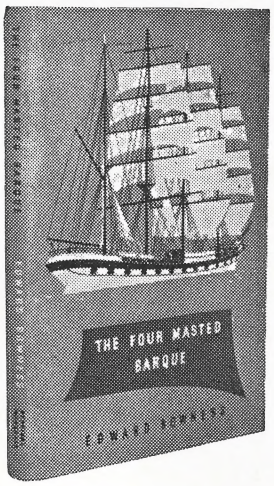

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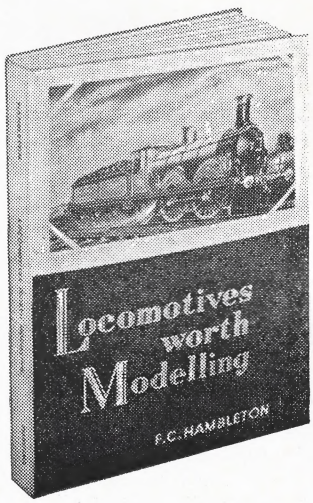

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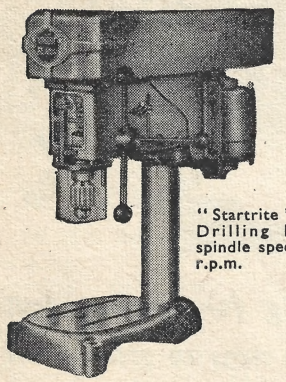

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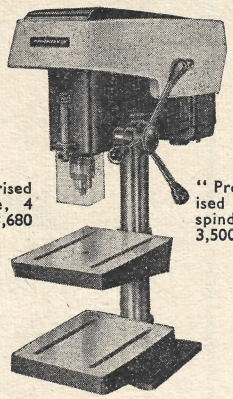

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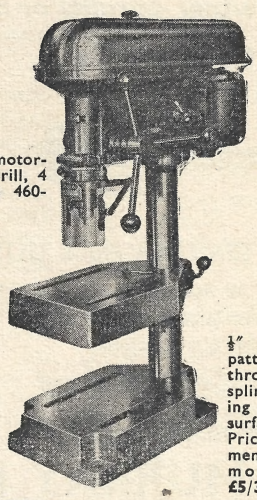

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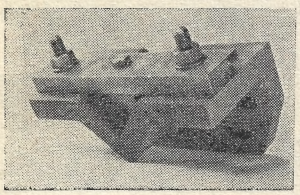

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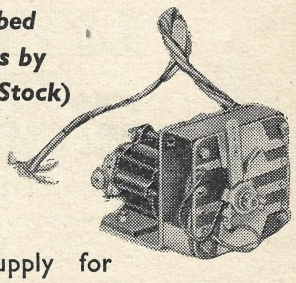

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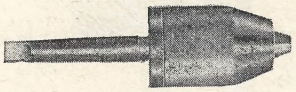

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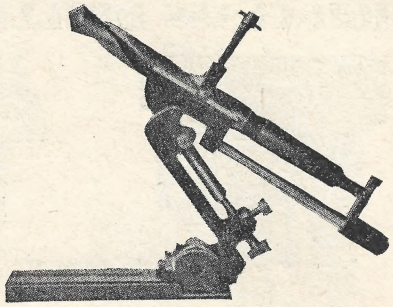

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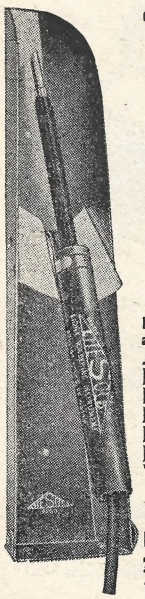

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NOTE NEW VENUE: *This year's Exhibition will be held at Central Hall, S.W.1, near to Westminster Abbey.*

The Competition Section is open to all and there are a number of cups and medals to be competed for, in addition to diplomas, cash vouchers and workshop equipment.

Entry forms and information from Exhibition Manager, 19-20 Noel Street, London W1.

CLOSING DATE FOR ENTRIES IS

Friday, July 7

Model Engineer

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COVER PICTURE

Traction engine enthusiasts will be indebted to Mr H. C. Stenner, a Devonian agricultural engineer, for the expert way he has rebuilt this 1907 Burrell. See page 740.

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The Editor is pleased to consider contributions for publication in MODEL ENGINEER. Manuscripts should be accompanied by photographs and/or drawings and should have a stamped addressed envelope for their return if unsuitable. None of the contents of MODEL ENGINEER may be reproduced without written permission.

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A WEEKLY COMMENTARY

Smoke Rings

By VULCAN

THE idea for Commonwealth Technical Training Week arose in the lively mind of the Duke of Edinburgh during a visit to Melbourne in 1960 when he was much impressed by the work exhibited in the Apprentices' Week Competitions, now an annual event in Australia.

During the Duke's visit the bronze medallion for craftsmanship was won by Alan Onley, then a fourth year apprentice in a sandwich course in which he divided his time between Echuca Technical College and a ball bearing factory in Echuca.

ME design

Of special interest to MODEL ENGINEER readers is the entry with which Alan won his award. It is an excellently finished example of the ME Bench Hack-saw, the plans reaching Alan through the good offices of a friend, Mr Ian M. Stewart, to whom I am indebted for this information.

We are, of course, very happy to hear of Alan's success and we wish him belated, but nevertheless sincere, wishes for the future. Perhaps Commonwealth Technical Training Week has encouraged a few other youngsters to look to model engineering as a supplementary aid to their apprenticeship.

It is hoped to have a report of the Training Week in an early issue.

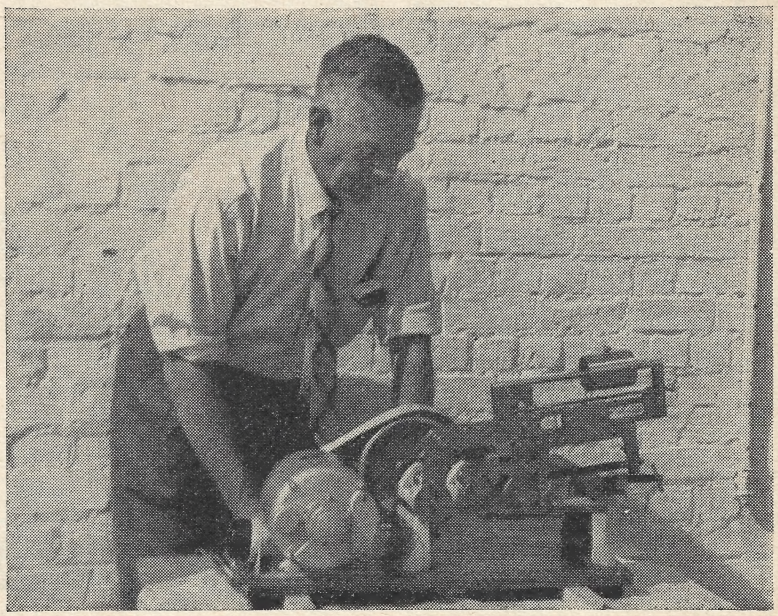
Photographing models

IN some general correspondence on the subject of photographs Mr Herbert W. Holmes, of Ealing, asked me for a few tips on taking pictures of models to illustrate articles.

As an amateur photographer I would be happy to comply, but my colleague Mr Edgar T. Westbury is more qualified to write on this subject and he has generously obliged with a four-part serial which begins in this issue.

He has done more than point the way to the production of good pictures; he has gone to a deal of trouble to search out examples illustrating how not to do it.

Now let us see just how good you



Mr R. T. Sergant, instructor at the Echuca Technical College, with the hack-saw machine which won a bronze diploma for Alan Onley

are when you have absorbed Mr Westbury's instructions. Get that camera out, set up your lighting in the accredited fashion, and let the Editor see what an excellent photographer you are.

To the reader who sends in what is regarded as the best picture of a model or piece of workshop equipment a prize of 10 gns. will be awarded, with 5 gns. to the runner up.

Conditions

The rules are simple. The photograph must be the work of the entrant; it must be of a model or piece of workshop equipment; it must be no less than 6 in. × 4 in.; and it must have the sender's name and address with a description of the subject written on the back. (Do not write too hard or you will damage the photograph.)

The Editor reserves the right to publish entries submitted to the competition, and for any reproduced a guinea fee will be paid.

So that overseas readers may have a chance to enter the closing date will be October 31. It is hoped that winning pictures will be published in the Christmas Number.

There is one final condition. Entry is free but each picture submitted must be accompanied by a coupon printed at the end of each instalment of Mr Westbury's series.

From down under

MODEL engineering shares with other basic hobbies a universal appeal, which explains why this magazine enjoys a circulation in more than 60 countries.

The situation is reflected in the news which filters through from all quarters. But I must admit to a raised eyebrow when a cutting from a New Zealand periodical dropped on my desk.

It showed the Earl of Northesk, an eminent figure in the model engineering world, inspecting exhibits at the recent Model Railway Exhibition. Nothing very remarkable in that, even in a New Zealand magazine, for, as I have said, the hobby is international.

But the curious thing about this cutting, sent to me by Mr D. J. Blenkinsopp, of Auckland, is that it was passed to him by his mother who saw it in the woman's magazine she takes !

Perhaps there is some subtle propaganda at work.

Valve gears

CAN full-size compound practice be successfully adapted to model locomotives ?

This was one of the many questions put to Mr C. M. Keiller, well-known model engineer and authority on valve gears, when he lectured to the Society of Model and Experimental Engineers at the Caxton Hall.

Mr Keiller has no doubt about the answer. Three of his nine model locomotives are compounds and they function quite satisfactorily on his 2½ in. garden railway which has inclines as steep as 1 : 37.

Mr Keiller ranged over a considerable number of compound valve gears, illustrating his lecture with projected diagrams showing the efficiency, or otherwise, of some well-known gears.

It is hoped that his fine lecture will be published in MODEL ENGINEER at an early date.

Maiden voyage

SO *Canberra*, Britain's newest passenger liner, is on her maiden voyage—a three-month cruise to the Mediterranean, Australia, New Zealand and the Pacific coast of North America.

Though this is considered out-of-season for world cruises, the 45,000 ton liner was fully booked with 2,238 passengers, an intimation that the travelling public have taken to this unconventional vessel with its unusual profile, aft-set engines and aluminium superstructure.

Men who have served in sail are often critical of steam and motor vessels, particularly when their outlines show less and less regard for the traditions of masts and funnels. But shipping styles, like all things, are constantly evolving, and *Canberra* undoubtedly illustrates the most advanced liner design of today.

If a four-masted barque were to be built now, its construction would show certain evolutionary trends, making it, perhaps, quite different from the famous barques of the last century. No doubt a few eyebrows would be raised.

The P & O *Canberra* has got off to a good start; may it augur well for her future.

Next week

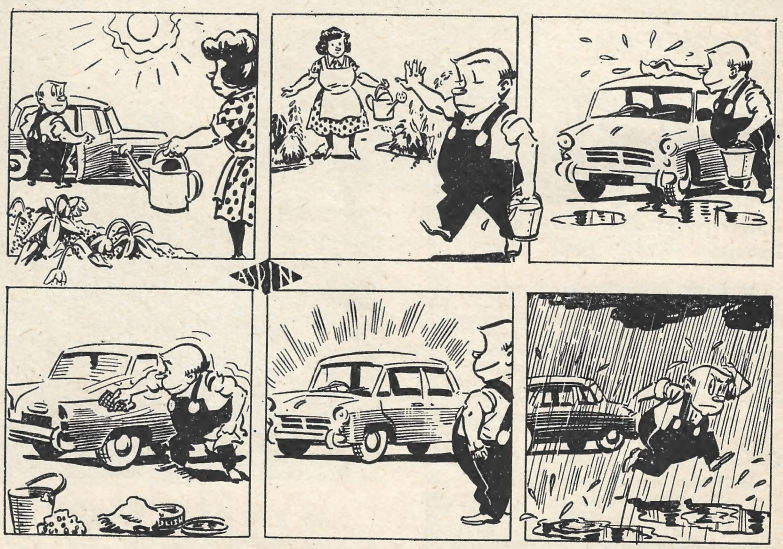
Robert Fleming will discuss some of the notable locomotives seen at the recent exhibition at Marylebone goods depot to commemorate the golden jubilee of the Institution of Locomotive Engineers. This issue will also carry an illustrated report of the Andover traction engine rally.

The competition

Those of you who have not yet completed your entry forms for the grand competition which MODEL ENGINEER has organised in conjunction with P & O have only a fortnight left. It would be a shame to miss the opportunity of winning a handsome silver cup, presented by the P & O, because your entry form was late. You have until June 30 to return the form, and until July 31 to complete a model of *Canberra*.

Just in case you missed the earlier entry forms a final one will appear in ME for June 29.

CHUCK . . . **. . . THE MUDDLE ENGINEER**



Just LOOKING at things

By EDGAR T. WESTBURY

AMATEUR photography and model engineering are useful and creative hobbies which have much in common. One can be used to aid the other in many ways.

Most model engineers feel the need at some time or other of a means to produce good technical photographs of their models, or of originals suitable for modelling, while the photographer can improve and augment his accessory equipment with the aid of model engineering tools and equipment.

Many articles have been published in ME on both these aspects of photography. There is, in addition, a Percival Marshall Handbook, *Photographing Models*, by J. H. Ahern (3s. 6d.), which contains a good deal of practical information.

Nearly everyone nowadays has a camera; at most model engineering events, indoors and out, we (almost invariably) find a veritable barrage of lenses bearing down on every object of interest. Yet the results obtained from these activities seldom reach a very high standard, either technically or pictorially. Many photographs submitted for publication in ME are found to be unsuitable, and in competitions for photographs of models relatively few pictures of outstanding quality are submitted.

Special problems

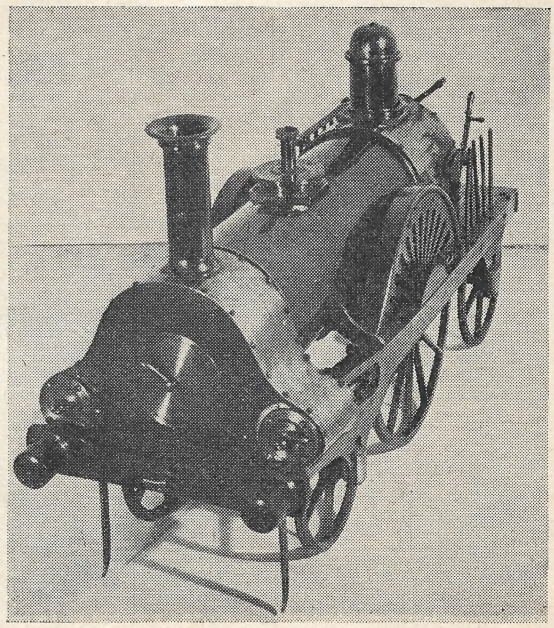
Many amateurs, and even some professionals with a good deal of general knowledge and experience of photography, fall down badly when they attempt to deal with small technical subjects. It is possible that the reason for this may be the way in which everything in photography is made to appear very easy, so that many camera operators either do not realise that certain problems are involved, or fail to concentrate on them, and are neither skilful nor discriminating in the way that they tackle technical subjects.

While there need be no formidable difficulties in technical photography, it is certainly a specialised field, which calls for some study. Miniature work in particular has its own problems, because close-ups of any kind demand special care in lighting, focusing and posing to obtain the best results.

The "can't care less" attitude of many people in their approach to photography is reflected in the casual use of the popular term "snaps." If a thing is worth doing at all it is worth doing well, and those who think that it is too much bother to study the special problems in technical work would be better advised to save their films for much easier subjects.

I do not propose to discuss in detail the routine operations in photography, such as exposure, developing, printing, as they have all been dealt with in the many elementary books on photography and the various technical journals. The particular angle which I propose to deal with in a number of articles is the one encountered in technical work, with particular reference to small and highly detailed subjects, including the choice of a suitable camera and associated apparatus, and the methods of lighting.

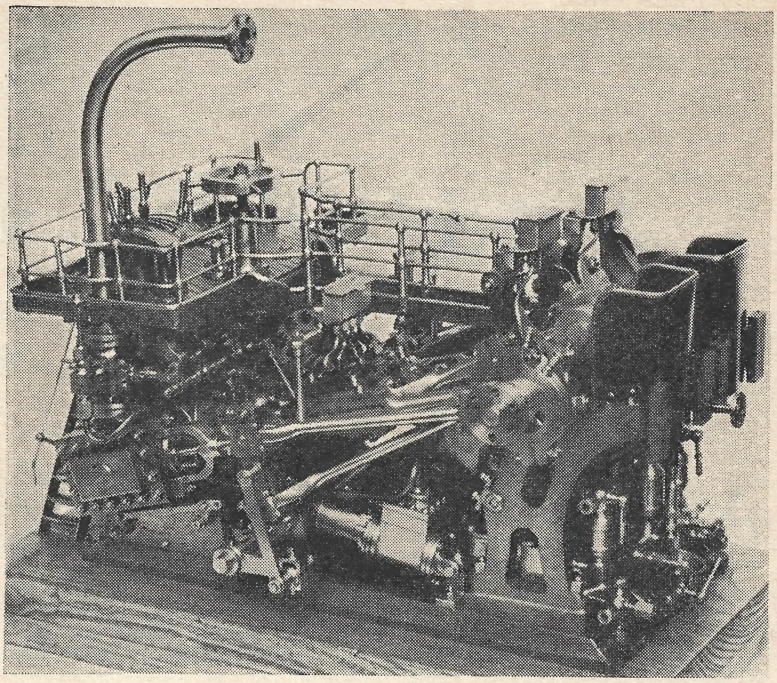
Before going into these matters at all, the would-be photographer should first of all learn how to *look* at a



Both the viewpoint and lighting of this model could have been much improved

subject properly. This may sound too elementary for words, but the fact remains that a very large proportion of photographs are taken from wrong angles, or with very erroneous ideas of how to obtain the maximum value.

Except in cinephotography, the camera can record only a transient glimpse of a subject, and this glimpse does not necessarily portray a comprehensive picture. The saying that "the camera cannot lie" is only a half-truth. As it has no ability to form its own opinion, deceptive or otherwise, it cannot lie in that sense of the word, but what it can do is to give a false impression. People seeing a portrait of themselves will often say: "It's not a bit like me," which really means that, at the instant the photograph was taken, the sitter must have been showing an uncharacteristic expression, or that some trick of the posing or lighting introduced an apparent error.



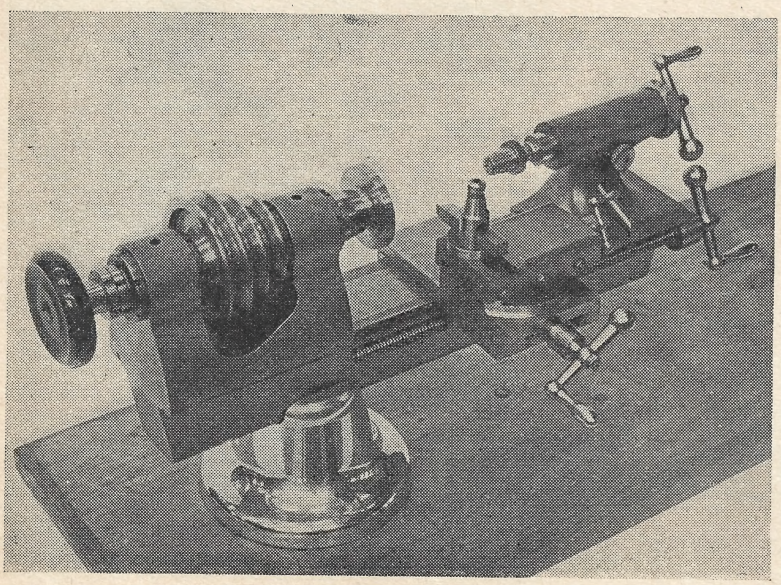
Above: A highly detailed model that can present special lighting problems

Conventional viewpoints

Models cannot change their expression, but they can be wrongly viewed or lighted. In the past, certain conventions on how the model should be photographed have arisen, but they should not be accepted without some qualification.

For instance, it is often stated that the only position from which a photograph of a model locomotive should be taken is at the level of the buffer beam, because that is the position from which the photograph of a full-size locomotive would normally be viewed. This position, however, should be adopted only to show that the model has captured the characteristic appearance of the prototype. All too often it succeeds merely in accentuating the discrepancies! For the purpose of effective illustration, it is often very desirable to select a view-point which enables details of three sides of the model to be seen.

Below: Highlights and reflections may introduce a few difficulties



A draughtsman finds it necessary to make at least three orthographic drawings of an object to show its shape and form completely, but a good artist can do a great deal to portray this in a single perspective drawing. If it is permissible to take a number of different photographs of single model, various view-points can be adopted, but very often this is not practicable. Dead frontal or side views of models are rarely very satisfying by themselves, but such photographs of full-size originals may be extremely useful to show the dimensional relationship of the various parts, and for assistance in the construction of a model, as a substitute for, or supplement to, working drawings.

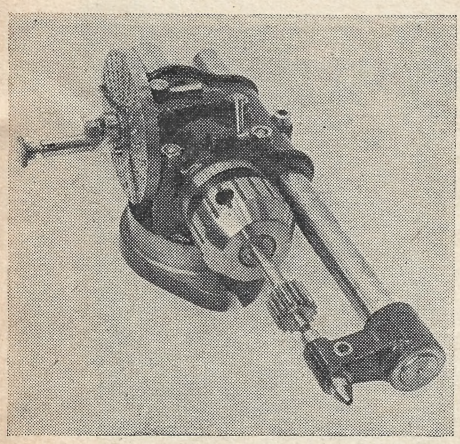
Illustrative values

Assuming that the camera lens does not produce distortion, and that the angle view is not too wide, the proportions shown in a photograph taken in this way are usually fairly accurate. It will thus be seen, that there are many sides to this question of posing a model, depending on just

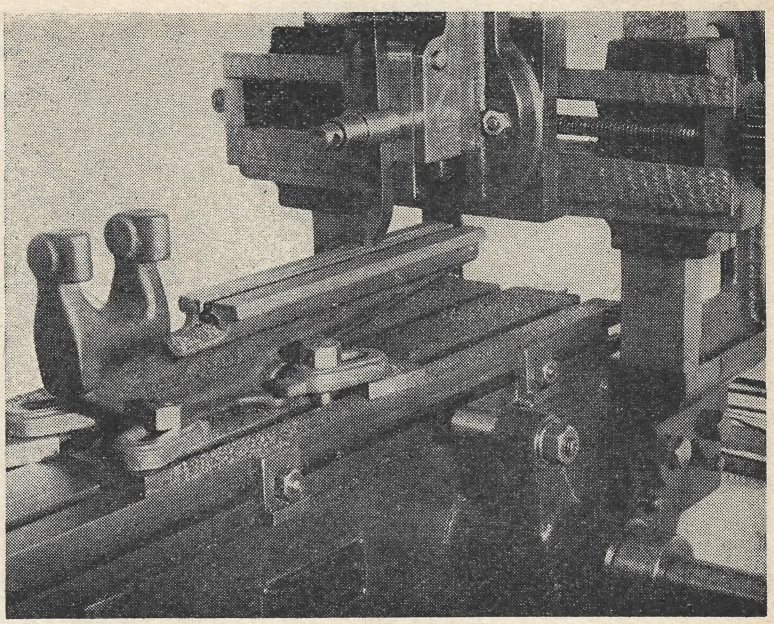
what the purpose of the photograph is to be, and that it is a matter which deserves careful study.

Apart from what one might describe as arty-crafty photographs, which emphasise the spectacular aspect, and often seem to be taken with the major intention of impressing the viewer with the cleverness of either the model maker or the photographer, the major object of photographs is, or should be, to convey as much information about the subject as possible. To this end, all detail within the range of view must be sharply defined, and well and evenly lighted. Exposure and development follow good standard practice, avoiding over-exposure which tends to flatten tone gradation and under-exposure which loses shadow detail and exaggerates grain; of the two, under-exposure is much the worse. The ancient rule of "expose for the shadows and develop for the high lights" cannot be bettered for technical photography.

In working models, where certain parts may move in relation to the rest, some careful attention to posing will often improve appearance and illustrative value. For instance, the handle of a cock, a link or lever, or the blade of a propeller, may look awkward and unnatural in certain positions, and should be shifted if practicable. Cranks and connecting rods generally look better when they are placed obliquely to each other than when they are in a straight line vertically or horizontally. This is particularly noticeable of locomotive coupling rods, where the dead centre or mid-stroke positions are generally undesirable. The hull lines of a ship model often look all wrong viewed from certain angles, and though this may be only an optical illusion, it is best not to perpetrate it in a photograph. Above all, avoid rigid adherence to rules and conventions.



The technical quality of this picture is marred by distorted perspective



A typical workshop operation photographed by artificial light

The examples of photographs shown here are not claimed to be ideal, or even moderately good, examples of technical work, but are selected more or less at random from a number which I have taken myself or drawn from other sources. An example of an awkward viewpoint is shown in the photograph of an antique locomotive model. Though its gawky appearance is not entirely caused by the angle of view, this has undoubtedly contributed to it. A lower camera position, some 30 to 45 degrees towards the side, would have looked better without being less informative. The angle of lighting is wrong for this view as the front buffer beam and the front of the smokebox have little detail in the shadows.

Models incorporating a complexity of detail are usually photogenic in the sense that the results look very effective, but it is not always easy to illuminate them properly so as to show all their parts and avoid glare from the parts which are light. The set of diagonal marine engines, taken in diffused daylight, mostly from the top, called for the use of reflectors to prevent the inner recesses from becoming merely a black mass. The rods and other machined parts, fortunately, were slightly greasy, and this helped to keep down glare; altogether the result is quite passable.

The small lathe and the dividing head were also taken by diffused daylight, and the detail has mostly come out quite well. Some trouble was encountered with reflections from the highly polished pedestal of the lathe, which insisted on throwing back a distorted image of the photographer's face and camera, but this yielded to a little patience and persuasion. The viewpoint of the dividing-head photograph could have been much improved, as the comparative nearness of the outboard support and back centre makes them look much larger than they really are.

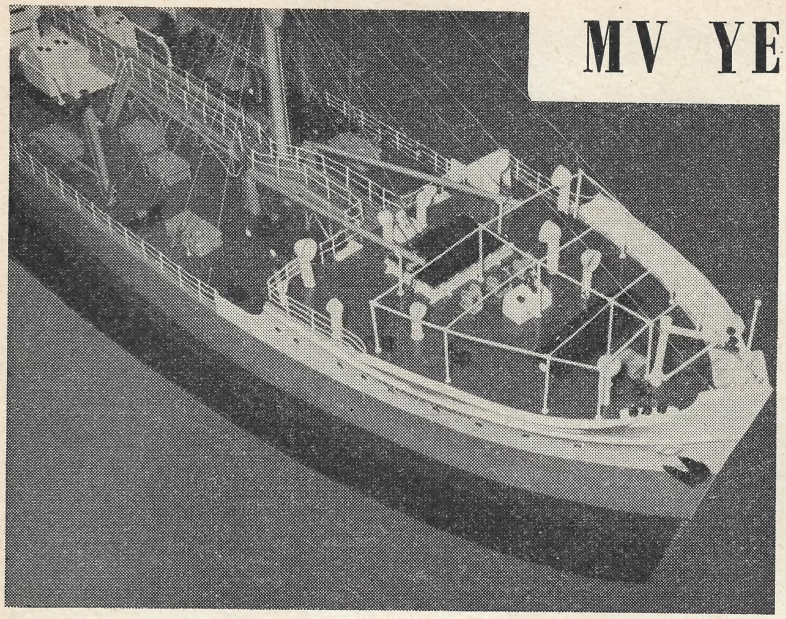
For informative value, the planing operation photograph is regarded as pretty good; it shows everything as it was intended to show, and the tone values are more or less correct, though the point of the cutting tool does not show up as well as one might wish. It was taken with the aid of two photoflood lamps placed well back and not shining directly on the subject, aided by reflection from white walls, ceiling and background.

In the next article I shall attempt to give some advice on the choice of camera and equipment for this branch of photography.

★ *To be continued on June 29*

See Vulcan's Smoke Ring about the special competition in connection with these articles. The coupon is printed below.

PHOTOGRAPHIC COMPETITION COUPON



MV YENANGYAUNG

Continued from June 1, pages 570 to 572

When ODDS AND ENDS are useful

"I save all kinds of junk," says D. W. GREENSLADE in describing some more of the detail on his model at 1:64 scale of the Burmah Oil Company tankship. This is the third instalment of his serial

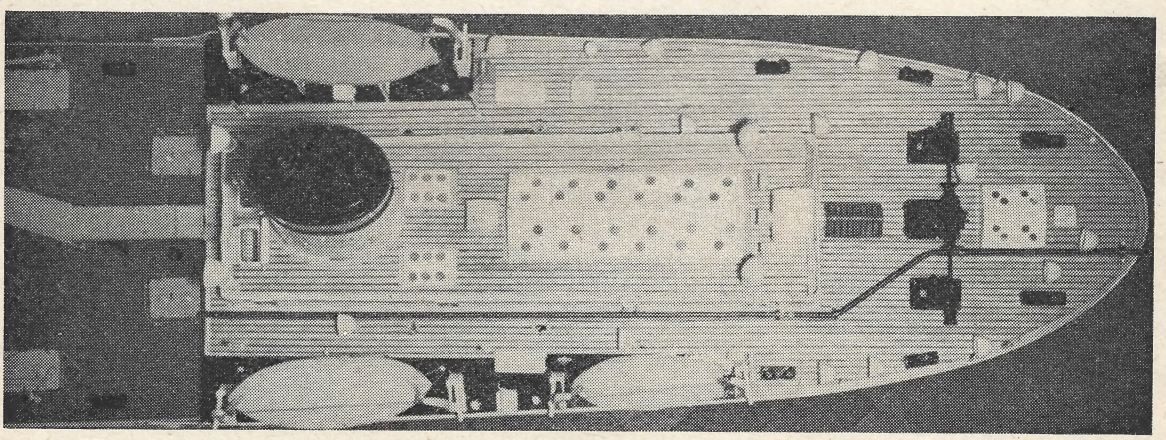
I MAKE my winches from plywood with brass rod for shafts and warping drums turned from dowel. To make the gearing I collect all the small brass gears I can find and even plastic serrated caps from small bottles.

Brake drums are discs of ply with card wrapped round for the bands. Control rods I make from pins, cable lifters from dowel or plastic, and steam cylinders from dowel. I save all kinds of junk that may come in useful. All small fittings are dope-finished.

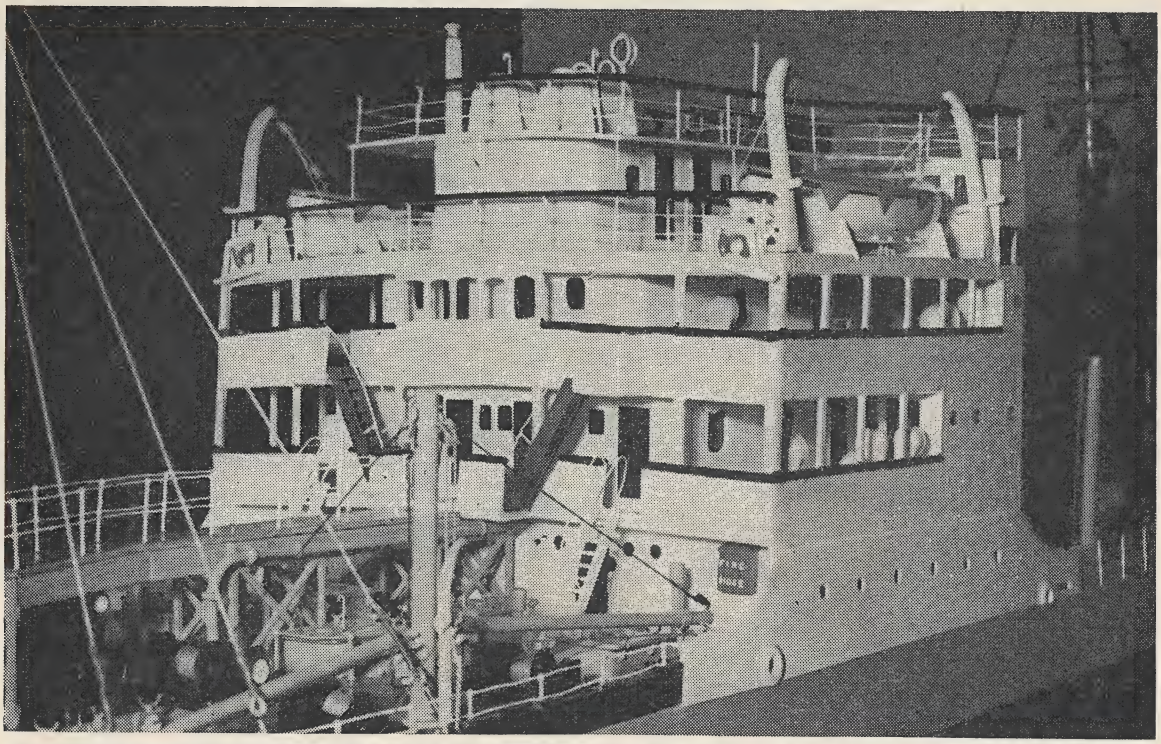
The well decks are of steel, and on the model I painted them red oxide colour. Here again there is a tremendous amount of detail. The fore and aft gangways, which are such a prominent feature of a tanker, connect the fo'c'sle with the bridge and the bridge with the poop. They are necessary on a tanker because the low well decks are often awash in heavy weather.

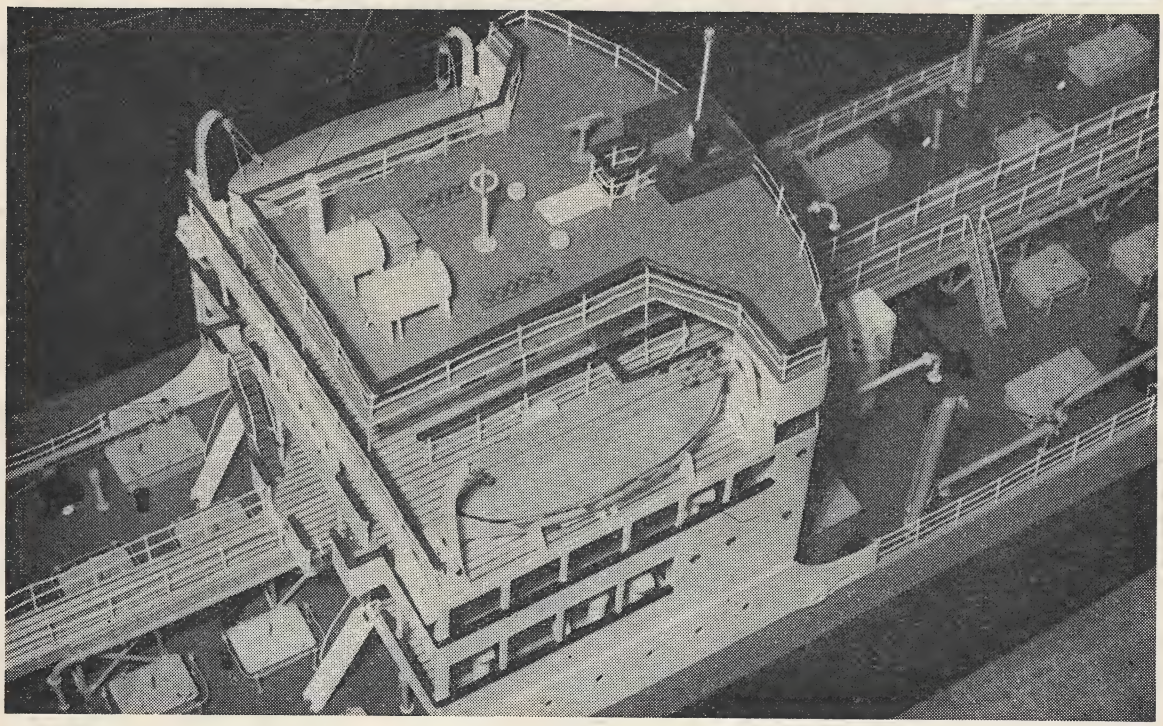
I built the fore and aft gangways from $\frac{1}{16}$ in. resin ply, and planked the deck on top with balsa. Along the gangway are two ball stanchions and rails along each gangway, and also a pipe made from dowel. Beneath the fore and aft gangway is a number of loading and discharging pipe connections, which were made from copper pipe, dowel and ply.

Just forward of the bridge pipes lead into the pump room and fan



Poop deck without the awning





Top: After view of bridge superstructure. Above: Top of the bridge, with water tanks, radio trunk lead in, accumulator box, fire buckets, DF loop aerial, rangefinder, binnacle, Morse lamp and other awning details

room. Two large cowl vents protrude through the skylight tops on either side of the fore and aft gangway.

Dotted about all over the well decks are dozens of control wheel valves, which connect with the tank spaces below. I did not know how to make the spoked wheels of the valves, as they are only $\frac{1}{4}$ in. dia. Eventually I noticed that some of the model motor cars in the Matchbox series by Moko Lesney had steering wheels which were just right. I wrote to the makers and explained my needs. Once again I was lucky, Moko Lesney very kindly supplied me with all the wheels I wanted at a very modest price. It was simple to fit them to columns made from dowel.

There are 24 tank hatches, and the outboard ones to the summer tanks are slightly longer than the others. In the hinged top of each are two sighting ports and a goose neck vent or ullage pipe.

A low handrail protects the inboard tank hatches on three sides. One of my biggest tasks in making the tank hatches was silver soldering pins to make the screw clamps which secure the tops.

On the after well deck the rails at the side of the ship are recessed to take the accommodation ladders, one on each side. A goose-neck davit slings the ladder outboard.

There are six samson posts with eight 30-cwt derricks on the well decks, and two 3-ton derricks are worked from the fore mast. Stowed alongside the gangway on the forward well deck is a 10-ton derrick which can be worked from either the fore or the main mast. The heel fittings to take it are mounted about 6 ft above the fore and aft gangway.

The masts are made from dowel, tapered by hand. There is a mast table on the fore mast with handrails round the top. It carries two floodlights and the blocks for the 3-ton derricks. Under it is a crow's nest which I made from plastic. Up both the masts and the samson posts runs a steel ladder.

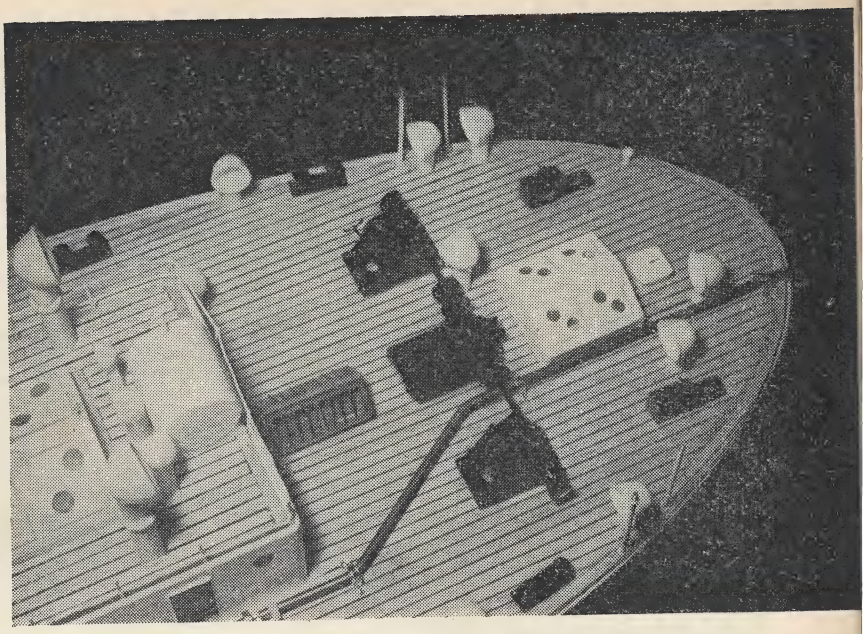
I cut navigation lights from brass rod, and gave them plastic lenses. The red and green of the side lights came from tooth-brush handles. Near the top of the fore mast is a signal yard, made on the model from brass rod.

Each mast carries spider bands to which the stays are shackled. The trucks at the mast tops were cut from plastic shirt studs. On both masts a foul air pipe runs from deck level to within a few feet of the top.

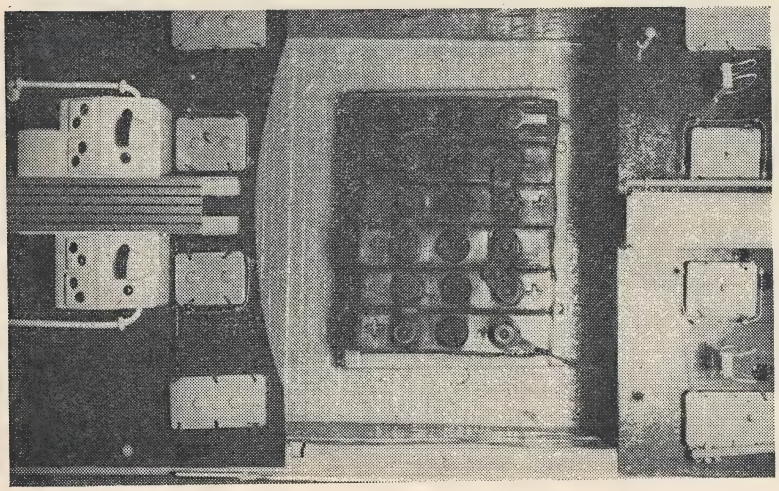
The fo'c'sle deck is of steel. On the model it is a ply deck.

Close to a jack staff in the bow is the anchor crane. Then come four hawse pipes with their cable stoppers and the big black Emerson Walker anchor windlass, flanked by cowl vents and bollards. Behind the windlass is a small hatch with a sloping top and two round ports. Next are a row of three hawse reels, a steel cargo hatch, a small skylight, more cowl vents, and a 200 gallon salt water tank. Over the forecastle the stanchions and framing carry an awning, when it is rigged. It is constructed of brass rod $\frac{1}{16}$ in. dia. with flat strips of brass $\frac{1}{16}$ in. × 22 gauge as the stretchers.

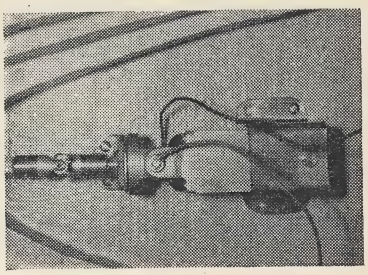
★ *To be continued on June 29*



Poop deck details before the awning was fitted



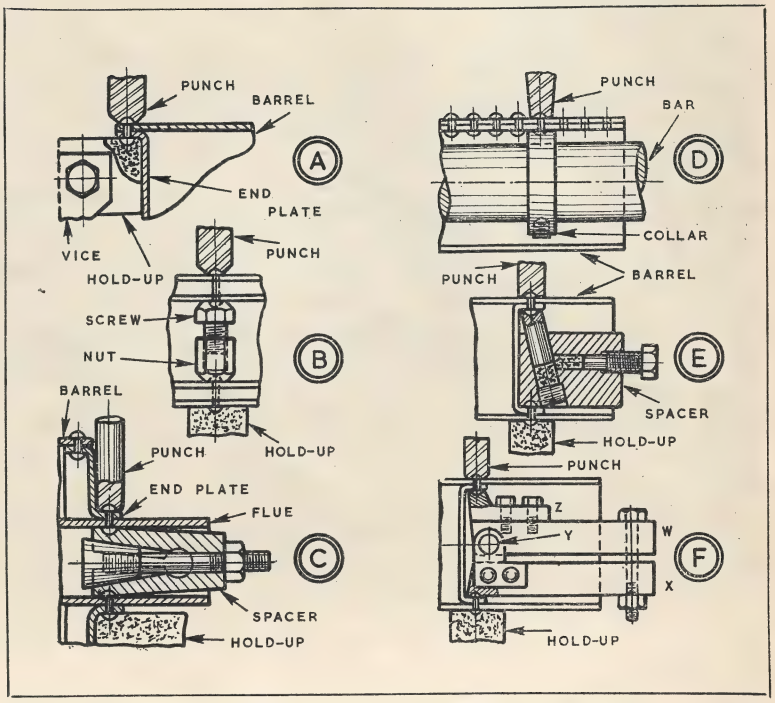
Left: Bridge taken off to show the 5 amp-hour accumulator. Below: Ball-bearing 12 volt motor with the coupling



HOLD-UPS and SPACERS for RIVETING

WORKSHOP HINTS and TIPS

By GEOMETER



ASSUMING that design is correct, efficiency and neatness are almost inseparable qualities in riveting, which is an essential operation in many fields of professional and model engineering. Correct design means, of course, that with due allowance for scale and contingent problems the boiler or other component has a sufficient number of rivets, of suitable size and material, disposed to take stresses in shear and give an acceptable factor of safety. At practical fulfilment, the result of much thought and many decisions on these matters is satisfying to an engineer and can be pleasing to a layman, for neat lines and groups of snap head rivets have more to offer visually than the finest welded joints.

As always, of course, between design and product lies the track of practical production—well-beaten, perhaps, but with pitfalls which require preparation to avoid.

Plates to be joined should be drilled so that rivets fit closely, and the burrs are removed at the edges of holes by filing or lightly countersinking. Rivets must be of correct length, their heads properly supported on hold-ups, and their shanks turned with snap head punches. Long rivets can be shortened by snipping the shanks and filing each one to length with the rivet pushed through a hole in a piece of flat steel bar, which can be faced to thickness if necessary.

Hold-ups and punches can be in mild steel or cast steel, made by dimpling the material with a drill, heating it to red, and driving it on to a hard steel ball. The facing of each should be so that the shoulder of a snap head is just proud of the end. The tools can be used soft, or mild steel can be case-hardened, and cast steel hardened and tempered. Hard copper rivets can be annealed by heating them to red and plunging them in water, to aid in forming snap heads on their shanks.

For riveting the flanged endplate into the barrel of a boiler, a hold-up and punch can be used as at *A* with the hold-up gripped in the vice. Ordinary care gives a good result; and for a simple job, the endplate can be invisibly soft-soldered by fluxing in the barrel, putting in a lump of solder and heating, so that with tilting and turning the solder runs all round the joint. Tinning before riveting is helpful in this work .

When a hold-up cannot be used direct, it is advantageous if, in design, rivets have been arranged in opposition. Then they can be fitted and finished in pairs, using a spacer as at *B*. Here the spacer is a screw and blind nut, each machined from hexagon rod to tighten with spanners with the rivets in place.

For supporting at a distance down a tube (like a flue), a spacer can be made from round mild steel, as at *C*. The piece should be drilled and tapered inside on the lathe for a cone and drawbolt. With rivet head depressions made, the material can be cross-drilled and slit to expand. Round the diameter, between the rivet head depressions, the material should be chamfered by filing to clear other rivet heads.

For riveting down the length of an open-ended barrel, a hold-up, *D*, consists of a piece of heavy mild steel bar with a movable collar. One end of the bar is gripped in the vice and the other held by an assistant.

Expanding spacers for working at a distance down barrels can be made on hydraulic or mechanical principles, as at *E* and *F*. The body of the hydraulic spacer is from rectangular mild steel bar, drilled and reamed aslant to take a well-fitting plunger with the open end of the hold plugged. Another hole is drilled from the end, breaking into the first, and is tapped for a pressure screw which is fitted after filling the holes with thick grease.

The mechanical spacer consists of bars *W* and *X* hinged at *Y*, at a small off-set from the rivet line. One carries a screwed-on jaw *Z*. Tightening the bolt expands the spacer between two rivets. ▣

ANDOVER lays on everything

L. C. MASON reports on a great steam day in Hampshire

Wallis and Steevens at quarter scale follows HIS MAJESTY, *Burrell No* 2877

From the wheel of the Foden MIGHTY ATOM (*D type tractor No* 14078), *Ian Fraser studies the line of approach*

DRIVERS and owners of engines attending the Andover traction engine rally saw their efforts rewarded by brilliant sunshine on brass and paintwork. The biggest crowd yet to attend an Andover rally made a bright summer occasion of it.

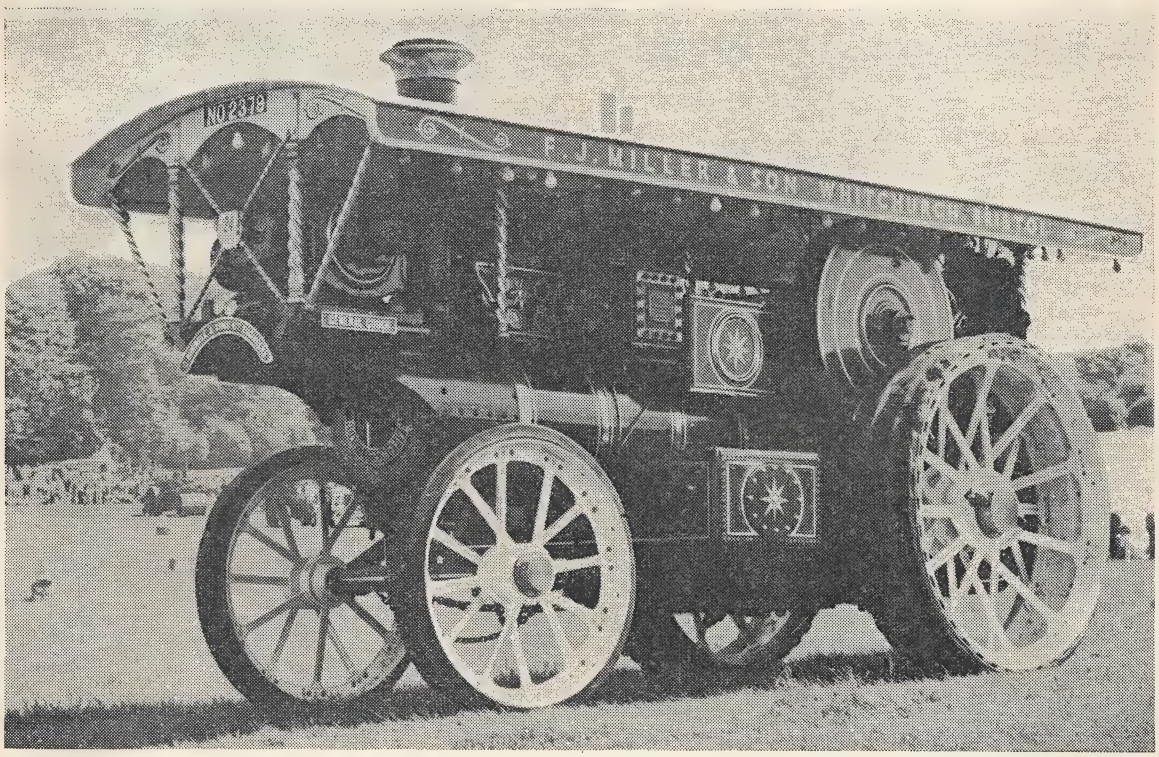
The rally was officially opened by Mr Ian Fraser from Arbroath, who regretted that he was unable to bring his Marshall down from Scotland to take part. A programme of the events showed off the skill of the drivers and the tractability of the engines.

Two beautifully restored 8 h.p. Burrell Showman's engines attracted a permanent crowd of admirers; they were No 3888 *General Gough* and No 2877 *His Majesty*. The oldest engine present was a Fowler single cylinder of 1898—No 7786, still nippy enough to acquit itself well in an obstacle race. Fodens and Sentinels were smartly represented.

The smallest engine present under steam was Mr L. Smith's 3 in. scale Wallis and Steevens, described in MODEL ENGINEER of April 6; the next smallest real one was the four-ton Tasker's Little Giant No 1296, originally used as a banking engine on horse-drawn trams in the hilly Crystal Palace district—hence its name of *Horses' Friend*.

Two official entrants which failed to arrive were an 8 h.p. Burrell Showman's engine, reported to have broken an axle, and a single cylinder Fowler which developed tube trouble. A very late arrival was a beautifully prepared Sentinel DG tractor, notable for a separate winch engine mounted at the rear, and originally used for timber hauling.

The Andover and District MES who organised the rally also staged a small exhibition of models in a marquee. Appropriately, the emphasis was on traction engines, and models from $\frac{1}{2}$ in. to 3 in. scale were on show. Among them was a pleasing $1\frac{1}{2}$ in. scale Allchin engine, on loan. For the smaller visitors, who tended to get a crick in the neck when they

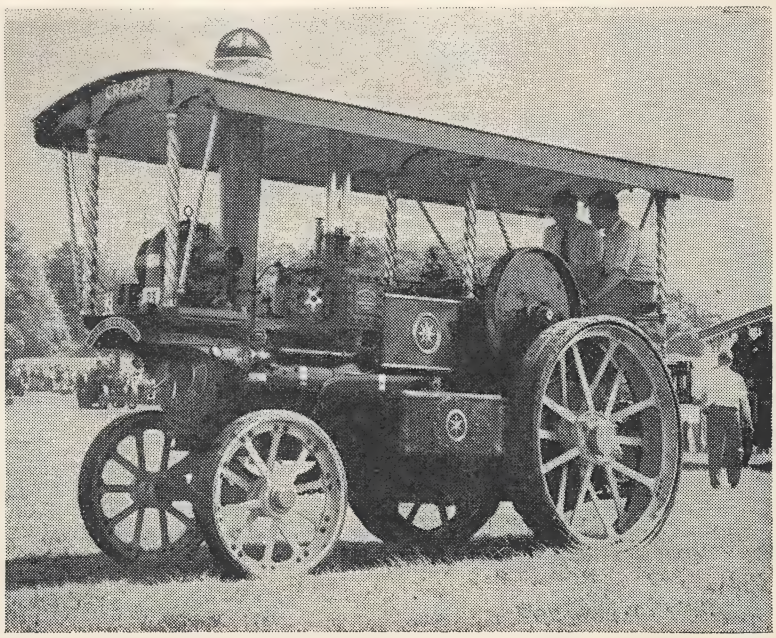


Burrell Showman's No 3888 GENERAL GOUGH *had been extensively reconditioned*

were close to the big showmen's engines, the 3½ in. gauge locomotive track operated by the Southampton and District Society had a strong appeal.

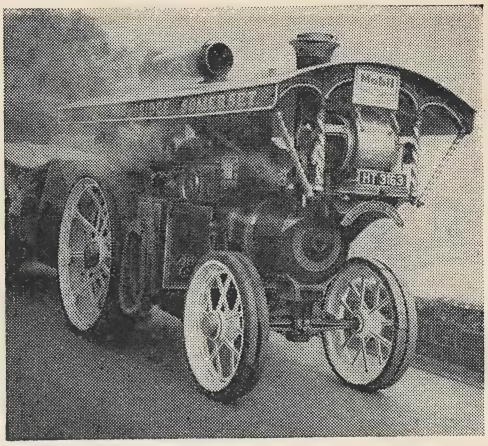
Following the engines in the preliminary parade came a fine collection of veteran vehicles, ranging from a 250 c.c. BSA motor cycle of 1926 to a 1914 40-50 Rolls-Royce, and in age from a 1906 Wolseley-Siddeley to a potent-sounding 1939 Bugatti.

An event to everyone's taste was a fire-fighting demonstration by a horse-drawn Shand Mason fire engine of 1904. Steam was raised from cold, the horses were collected and harnessed up, and the engine was in action in an incredibly short time. The spray from the hose, for those who were damped by it, was a welcome cooler. ▣



Burrell No 3192 ST BERNARD, *built as a crane tractor in* 1910, *was converted to a showman's tractor* 40 *years ago*

NEW LIFE for 1907 SHOWMAN'S ENGINE



" *Everything about her is as the old-time showman would have it* "

REPRINTED FROM " THE WESTERN MORNING NEWS "

By courtesy of that distinguished Plymouth newspaper

A VINTAGE Burrell showman's road locomotive made in 1907 has virtually been reborn in a workshop at South Molton Road.

Eighteen months ago the locomotive, almost derelict, arrived at Messrs T. C. Stenner and Sons, threshing contractors and agricultural engineers, of South Molton Road.

The man who has been mainly responsible for the renovation of the Burrell is Mr H. C. Stenner, for whom the long and arduous job of rebuilding has been almost a labour of love.

Mr Stenner is a steam enthusiast and a fairground enthusiast. He is known to Westcountry showmen's families and for several years part of Anderton and Rowlands' almost legendary Golden Dragons rested on the edge of his yard in sections.

He has made sure that the Burrell has not only been rebuilt mechanically, but that she has been re-created strictly on traditional lines. Everything about her is as the old time showman would have it.

The Burrell at one time pulled a set of roundabouts up and down the West country hills. She was built by Messrs Burrell, of Thetford, for Mr Charles Heal, of Bristol, a West of England " riding master," whose pride was a dazzling set of gallopers.

She left the works on February 20, 1907, and for many years she chuffed away beside the ornate roundabouts.

Then came the diesel and the eclipse of steam on the fairground. For nearly 12 years she was silent, but eventually a steam enthusiast, Mr D. W. Emery, of the Railway Hotel, Highbridge, bought her from Messrs Heal and sent her down to Mr Stenner to be renovated.

Westcountry steam engine lovers will be able to see the result of his work this week-end at Avon Banks fairground, Exeter, where *His Majesty* —a typical showman's title—will be standing under steam.

Today the Burrell will relive a journey she must have made many times in her heyday. But this time the circumstances will be completely different, for she is taking part in the Exeter diocesan youth pilgrimage to commemorate the massacre of Bishop Patterson, of Melanesia.

The Burrell will draw a farm cart loaded with pilgrims from the Chulmleigh Deanery—on this pilgrimage only old-time transport will be used —and Mr H. C. Stenner will drive.

The party will leave Mr Stenner's yard this morning, with Mr M. Thorne, a former threshing tackle driver, as steersman.

More than £4,000 was recently offered for a 1925 Burrell similar to *His Majesty*. Vintage showmen's locomotives in first-class condition are rare. Only about 1,000 were made.

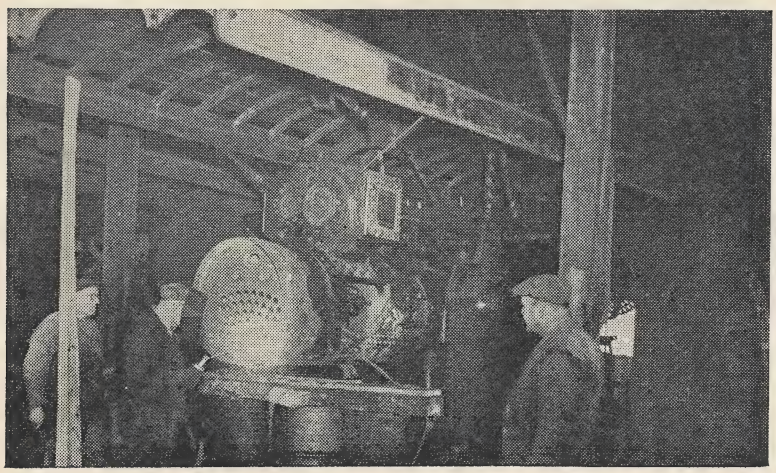
Mr Stenner has repaired the firebox, put in new tubes and smokebox, repaired the chimney, made fresh fittings and pipes, and renovated the engine generally. Recently, to his great satisfaction, she passed a rigid boiler test at full pressure.

Mounted out in front, as was the custom, the Burrell has a generator which delivers sufficient electricity to light a medium-size village.

The lining of the locomotive and the style of the lettering on the canopy are completely " showman " in character and were the work of Mr J. Whitehead, of Barnstaple. The canopy edge was rubbed down and repainted 14 times before it was considered right for lettering. Mr S. Hill, of Appledore, did the welding.

Mr Stenner has had the locomotive on the road for a trial run and he is sure she would still pull the full showman's complement of three or four wagons and a water tender.

The Burrell's days as a showman's engine are over, but she is likely to have many years of life ahead of her as one of the principal attractions at steam engine rallies all over the country. ▣



Far from the noisy world of roundabouts, the Burrell was restored before it went on the Devon pilgrimage to commemorate Bishop Patterson of Melanesia

BLACK SAND

RAIDER IN THE SKY

GEORGE W. EVES tells of a dramatic night during the First World War and of the day when women came to work, for the first time, in the foundry where he was a young apprentice

CHARLES went to great pains to see that just the right amount of plumbago was added to a saucepan of water. It was all a matter of seeing it ran off the brush just so. With broad sweeps of a large brush, the master hand transformed the yellow core into a shiny black one, something to admire, but not to touch because a piece as big as half-a-crown came away with the offending finger.

I saw that the cartoonists had been busy again, for there was I in exaggerated cap and overalls, with icicles everywhere, a reminder of the fire which went out.

Cruising high over Hertfordshire one night in 1916, Leefe Robinson, a pilot of 21, saw a Zeppelin held in the glare of searchlights.

Diving upon the huge airship, he fired into it drum after drum of incendiary bullets.

Like a fiery meteor, the machine dropped into a field at Cuffley, its blazing wreck lighting up the heavens while all London watched.

Leefe Robinson was awarded the VC for his work that night.

About ten o'clock that night when supper was about to be cleared away, the dog who had been snoozing in front of the fire began to bark. When the geese outside started gobbling we looked at each other for geese, they say, have very keen hearing. My father strode out of the house and quickly returned. "There's that strange sound in the sky again. Zeppelins."

We trooped outside into the darkness, carefully closing the door behind us in case the soft glow of our oil lamp should aid the enemy. From somewhere in the sky came a rhythmic roar of engines. Then the generator engine on the searchlight post behind us started up, and had no sooner settled down to a steady "hit three and miss one," than a white finger of light stabbed into the heavens. It swung about a bit as if unsure, sometimes going back on its tracks, but always searching for that elusive sound in the vastness above. Suddenly the beam dropped low over the far horizon and then slowly elevated.

I was hopping about in my excitement. We all shouted: "There it is!" And there, in that cold all-revealing light, I saw a Zeppelin, for all the world like a silver pencil. The black figures on the gasbag were indiscernible, but the whirling propellers fore and aft glistened in the light.

Indescribable din

Without any warning, the anti-aircraft gun opened fire. There was a blinding flash, an ear shattering bang-bang, and a long-drawn-out scream as the shell flew skywards. Pandemonium broke out in the farmyard, every animal protesting.

The Zepp shut off its engines as we flew for the door. Mother was in the lead, and we all followed her, with the dog barking. The gun had unleashed four more rounds and the din was beyond description, with people shouting, cattle bellowing, horses neighing, geese in full cry, chicken cackling, and tiles crashing into the drive.

Inside the house, jugs jumped from hooks on the dresser, cups and saucers and plates crashed to the floor, and the lamp went out. I heard the door slam behind me, and I found myself on top of the dog under the kitchen table where I had been forcibly propelled. It was a frightening minute. The gun had stopped firing, and I heard the Zeppelin's engines open up again, drowning the curses my aged aunt was bringing down on the Kaiser's head.

Curiosity had us all outside a few minutes later. The raider was heading away toward the Thames, but the searchlight still held it. As it moved away, other guns boomed defiance, and other searchlights fastened on to it. Climbing, it swung left and right in a vain effort to shake off those fingers. Red pin points of bursting shells winked wickedly.

Enveloped in fire

More guns were now booming away in the distance. Just as we were expecting a hit, every gun stopped while the searchlights still clung to the twisting raider. Suddenly a red pin point glowed on the rear end of the gasbag. It spread rapidly until we could see that the envelope was on fire from nose to stern. In a few moments it was one great ball of fire, resembling the harvest moon as it sank toward the distant horizon.

Down in the village there were lusty cheers, which ended in the National Anthem. Faster and faster sank that glowing ball of fire until it was lost beyond the distant hills. Then a great fan of light sprang into the sky and slowly faded out.

When the countryside had returned to its peace, we wondered if our imaginations were playing tricks. We slowly made our way back indoors, but in the meadow behind us the old oil engine continued to hit three and miss one.

Vintage home-made dandelion wine was brought forth to restore sagging nerves, and that night, for the first time, I was deemed man enough to have my wine neat. Slowly the farmyard ceased its protestations, and at three o'clock, an unearthly hour for us to retire, we crept upstairs to bed.

There is no need for me to say what the topic was next morning. Charles from his hilltop home had had a grandstand view of everything. He was sure that he had seen an aeroplane fly alongside the Zeppelin just before it burst into flame. I was curious when he showed me a shell cap which had whistled out of the sky and penetrated his wash-house roof and the lid of the copper. The

morning paper confirmed that the airship had been shot down by a plane. Nothing was said of where it had crashed, but everyone spoke of Cuffley.

Over in France and Belgium, as time passed, the sounds of war grew louder. Every vacant wall space was plastered with that most famous of all war posters "Kitchener Wants YOU." A good number enlisted and others wore the famous Derby armlet.

Skidpans, brake wheels and the like were returned to the loft where all patterns were stacked. Everything concerned with war took pride of place—castings for thread millers, castings for capstan lathes, castings for Mills bombs and mortar bombs and for brass shell-caps. Cartloads of core sand grew in height. New brass furnaces were built in the ground for natural draft, and one morning a new system was introduced.

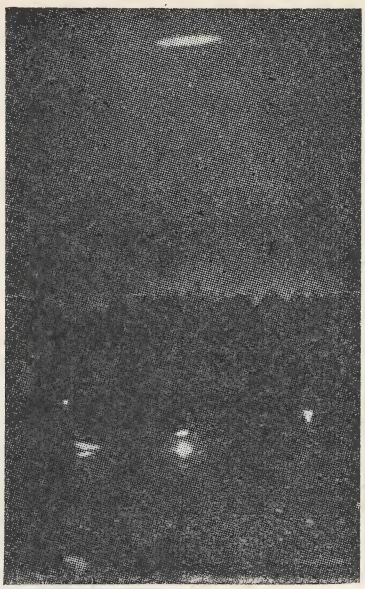
I saw two oblong cast-iron plates about 16 in. sq. One had raised upon it the shape of eight shell caps complete with runners. Three locating pins on two sides were obviously to centre the box, which was put on the pins and rammed up. A strong sense of feel was essential as the bottom plate was rapped on two opposite corners. With a quick straight lift, the box was deftly turned over and set on the floor—and there was the bottom half of the mould finished.

Eight times as quick

The other plate had the top halves of the shellcaps raised upon it, and a hole in the centre for the vertical pouring hole stick, a piece of 1½ in. wood dowel on which was placed a box whose guide pins fitted the registers in the plate. The dowel was removed before the box was lifted off, and the top box was then lowered on to the bottom one. The two halves matched perfectly. Eight caps could be moulded in five minutes, compared with forty by the old method.

There was talk of sweated labour and greedy bosses, and when red revolution seemed imminent the cry of "Tally-ho" would disperse the grumbling foundrymen. They were not the only ones who could have grumbled, because the demands for cores were never ending. Each night when I banked up the oven fire and slammed home the doors there was little shelf room left inside. I sifted cartloads of sand, sometimes like dust and sometimes soaking wet. The knife-edged winds whistled through the open-ended sand shed, and I wasted little time there before I returned to my bench and the comforting warmth of the devil on my rear.

The first day of the new brassing system was one of wild confusion. While some rammed up the moulds, others dried them with devils and gas jets. Charlie enjoyed the sight of the sweating foundrymen, to whom brassing had been something of a holiday, with a chance for making a few tools surreptitiously. Even Alice from the munition works viewed the scene with obvious relish; the men who normally had the breath to whistle her now had none to spare.



Above: The Zeppelin held in the searchlight beams. Left: Leefe Robinson, the pilot who shot it down

Next morning the foreman directed Charles to "take your mate" round to a shed on the far side and to get it cleared out, as it was wanted for an additional core making shop. Charles was not prepared for what followed. "We have two women coming in to make cores, and you can then join the shell cap gang. Your mate can stay here, keep the women supplied with sand and whatever they need, and look after the oven, the devils, and the fire in the new core shop."

Women making cores! Charles staggered under the mere thought of it. The foundrymen laughed, and the cartoonists soon produced a masterpiece on the oven doors, depicting Charles in an apron surrounded by hordes of buxom ladies.

The carpenters brought in a bench strong enough for plate flanging and the fitters a stove and chimney. Lights went up the same day. Between us we brought in all the tools of coremaking. The men stood by for the invasion next day, and Charles was the gloomiest of all.

It was nine o'clock next morning before the foreman presented the sensation of the century. One woman was very thin and tall and the other would tactfully be described as plump. They were promptly christened Bore and Stroke. Apart from taking in the sand, I was permitted to take no part in this innovation. The foundrymen continually wondered what sort of cores they were going to get, as my initial efforts were still good for ribald comments.

Charles spent all day with his new pupils and very soon I noted the improvement which they were making. Alice was quick to take him up on his earlier assertion that women could never make a core. He answered with a wan smile. Soon he was able to leave his new department to its own capable resources, and while the women continued to cope with the straightforward daily requirements he joined the shell cap gang and occasionally helped me with the brassing section.

When the reed-like Stroke arrived late one morning, she was rattled in, and, as she was not acquainted with this procedure she joyfully informed the foreman how busy the men were when she arrived. She was duly enlightened and when one of the moulders misread the clock a few days later there was a din from the new department.

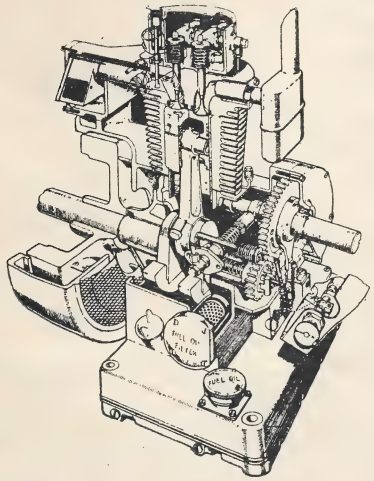
★*To be continued*

LATEST LOCOMOTIVE NEWS

Two SECR classes are on the verge of extinction; the O1 class 0-6-0s and the P class 0-6-0Ts. The only O1 surviving is 31065 stationed at Dover, while the only P in BR ownership is No 31556, which is the shed pilot at Brighton. There are a number of Ps owned by private railways; for example, the two on the Bluebell line and the one on the Bowaters system.

Earlier I referred to a rumour that the Schools class 4-4-0s were being withdrawn. Unfortunately this rumour is now fact and already three of these lovely engines have been cut up. The schools were the highlight of the development of the 4-4-0 type, with masses of power. They were designed by R. E. L. Maunsell and began to appear in 1930. The three cut up are 30919 *Harrow*, 30932 *Blundells* and 30933 *King's Canterbury*. It is reported that half of the class will have been scrapped by the end of 1962.—R.O.

Around the TRADE



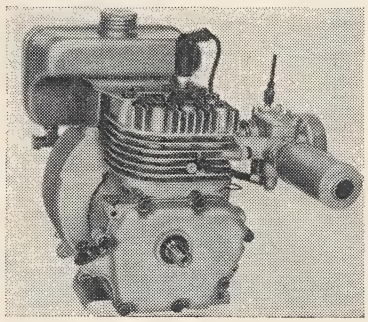
The 4 h.p. Villiers diesel

New engines

Two of the most famous names in the development of internal combustion engines, mobile and stationary, are the Villiers Engineering Co. Ltd, Wolverhampton, and J. A. Prestwich and Sons Ltd, Tottenham, London, N. These two firms are now amalgamated, and besides continuing production of their established individual types of engine are also introducing new types to keep pace with modern requirements.

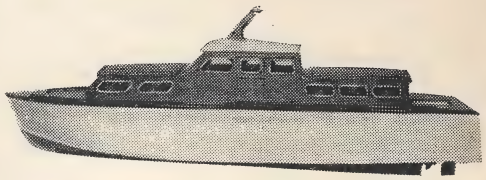
The new range of lightweight air-cooled industrial engines from 50 c.c. to 150 c.c., with power output from ¾ to 3½ b.h.p. is of special interest to readers of ME. They are designed for both horizontal and vertical shaft applications, and are four-strokes with side valves, blower cooling, and flywheel magneto ignition.

A special feature of the design is the use of aluminium alloy die castings for all main structural parts, including the cylinder, which has a cast-iron liner, nickel alloy valve seats, and inserted valve guides. The crankshaft is in one piece, and the connecting rod is a light alloy forging. An aluminium piston is fitted, with two compression rings, and one oil control ring. Lubrication is by splash, the sump having a large oil capacity, and a special device is employed for feeding oil to the big end bearing.



The 50 c.c. JAP-Villiers engine

The smallest engine in the range has an oversquare cylinder, 43 mm. bore × 34 mm. stroke; it develops 0.92 b.h.p. at 4,000 r.p.m. and weighs only 14 lb. A 4 h.p. air-cooled diesel engine has also been developed by Villiers, and is now in production. It has a bore and stroke of 70 mm., compression ratio of 24 : 1, and a weight of less than 160 lb., considerably less than any other engine of comparable type and size.



Cruiser kit

Power boat enthusiasts who are more interested in constructing an engine than in building a hull may like to consider the *Mercury* cabin cruiser which can be quickly assembled from a kit of parts.

The *Mercury*, marketed by Maycraft Ltd, of 17 Kingsland Road, London E2, is designed by Mr Harry May whose *Meteor* destroyer kit proved so successful last year.

Mr May's experience as a model engineer proved invaluable in helping him to get the correct lines and to be certain that the craft would sail well when suitably powered.

But solving the question of design answers only one of the two big problems in the manufacture of boat kits. The other difficulty is accuracy. Builders do not take kindly to kits which leave whacking great gaps where two sections ought to come neatly together.

Mr May found the solution by collaborating with a high-class furniture manufacturer. Accurate jigs were set up and the work was executed on the finest machines. The result is a kit which goes together like Sunsalve and David Broome.

The *Mercury* is 38 in. long and 11 in. wide and has a freeboard of 4 in. All plywood used is water-resistant to Board of Trade specification and all stringers are of seasoned mahogany.

Kits may be had from most model shops. They cost £6 12s. 6d.

Catalogue received

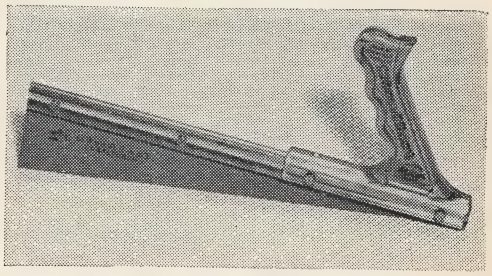
The new catalogue (No 61) of precision and hand tools, issued recently by Messrs Moore & Wright (Sheffield) Ltd, Handsworth Road, Sheffield 13, is produced in two forms, one being a pocket edition, 4½ in. × 7¼ in., and the other 8½ in. × 10½ in. Each comprises 138 pages, profusely illustrated, listing the complete range of products of this well-known firm, with details of current prices.

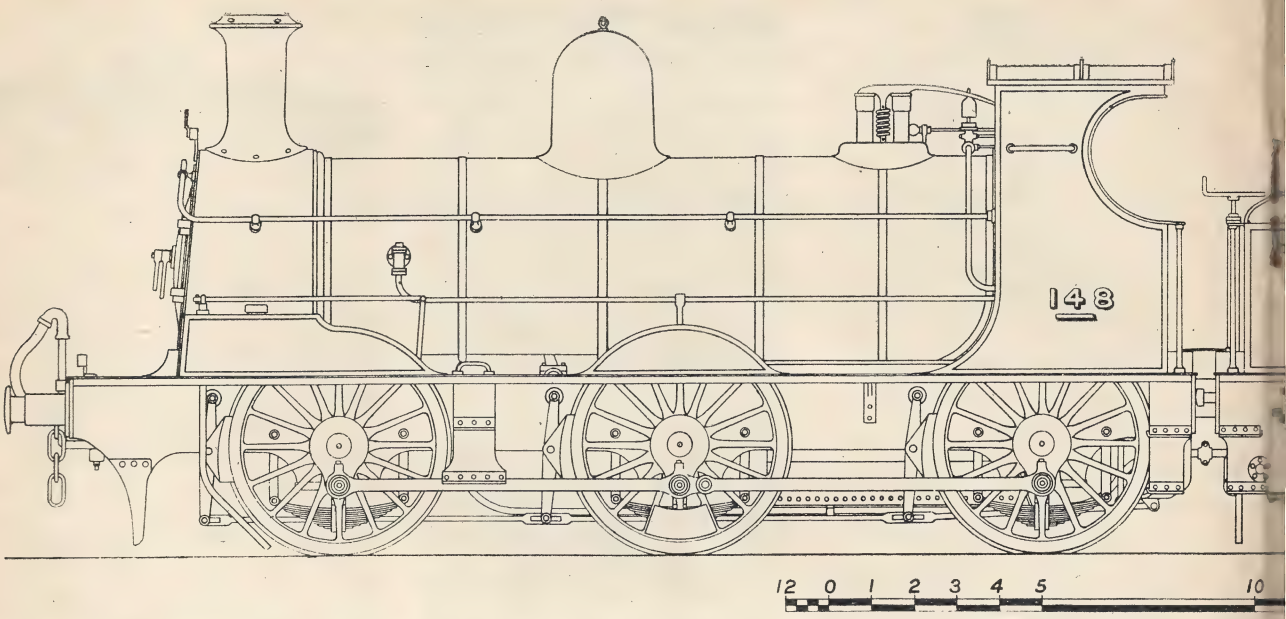
The Steadfast sheet saw

Messrs J. Stead and Co. Ltd, Manor Works, Cricket Inn Road, Sheffield 2, have introduced a new saw designed specially for sheet material, including steel and other metals, wood, plastics, and asbestos composition, flat or corrugated. It will also deal with tubes, blocks, boards and so forth up to 1⅞ in. depth of cut.

The frame comprises an unbreakable plastic hand-grip and a grooved metal spine, to which the triangular 12 in. blade is attached by three screws. Two blades, of Cobaltcrom abrasion-resisting alloy steel, with 14 and 24 teeth per inch, are supplied with the frame, and are available separately when replacements are required. The coarser-pitch blades are generally most suitable for non-metallic materials, as they cut more rapidly and are less liable to clog or jam than the fine teeth, though the fine are better for hard metals, particularly thin sheets or tubes.

A sample of the tool has been submitted for inspection and test, and has been found very useful for many purposes in the model workshop, including cutting out engine frames, tanks, cab, footplate and other sheet metal components. The Steadfast sheet saw is obtainable from most hardware and tool dealers.





LOCOMOTIVES I HAVE KNOWN

THE ADAMS

I BELIEVE I am right in thinking that the Adams Goods Engines were the first and only 0-6-0 tender freight engines that William Adams ever designed. Very excellent examples they were !

They were all built by Neilson & Co., of Glasgow, in batches: five in 1881, seven in 1882, twenty-four in 1883, thirty in 1885 and four in 1886, making seventy in all.

Pretty well every main line locomotive depot on the London and South Western Railway had its quota of them; yet it is surprising how rarely they were to be seen. The reason for this was that the LSWR was primarily a passenger-carrying line and nearly all its freight traffic ran during the night hours when all decently brought-up boys like me were in bed—or should have been. But provided that you knew where to go, you could find one or more of these engines shunting or marshalling in the larger goods yards during daylight hours. I used to see them at Nine Elms, Wimbledon and Aldershot; there was a considerable amount of military traffic at Aldershot where No 0148 was often to be seen shunting, or working trains of Government stores and sometimes troop specials, in the years before the 1914-18 war.

In 1916, 50 of these fine old engines were commandeered by the Government and, during the next two years, were sent out to the Middle East, for war service in the Railway Operating Division behind the various battle fronts. Of 36 of them sent to Palestine, four were lost when the S.S. *Arabic* was torpedoed in the Mediterranean Sea in 1918.

Five went to Serbia in 1916 and nine to Mesopotamia in 1917; none of the 50 ever came home again. As late as 1930, some were still working in the countries to which they had been sent nearly 15 years before, and a few had migrated to Greece, Turkey and Egypt, where they seemed to have become popular with the local railwaymen.

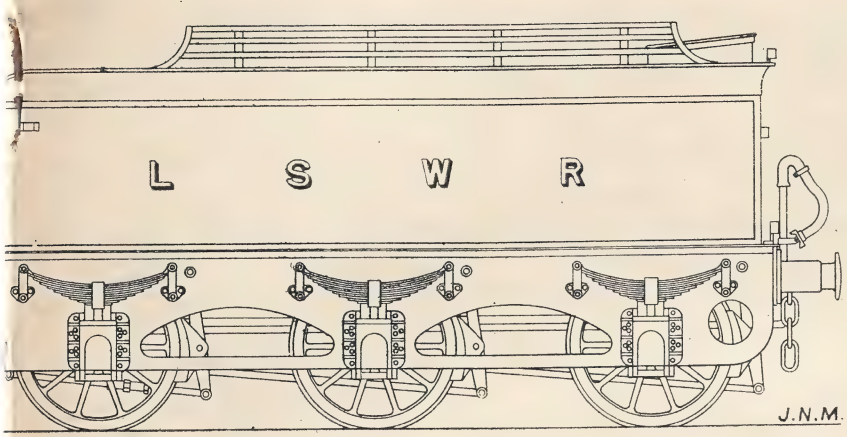
Of the 20 that were not taken over by the Government in 1916, all continued to work until 1933, when two—Nos 0153 and 515, then 3153 and 3515 in the Southern Railway list—were withdrawn. The remaining 18 lingered on to become the property of British Railways in 1948, and were renumbered 30564 to 30581 in the BR list. They put in about another 10 years of work on local goods traffic until the last survivor, No 30567—old No 154 of 1883—was withdrawn in September, 1959, at the ripe old age of 75 !

Let people scoff as they will at anything Victorian and Edwardian, these old goods engines were typical of the times in being verv carefully designed and built. Apart from having been reboilered four times, No 30567 was almost in her *original* condition when she was withdrawn. Compare this with the record of certain 0-B-B-0 and 0-6-0 diesel locomotives built from 1945 to 1950 and now withdrawn for scrap !

My drawing shows No 0148 in the condition in which she was when I knew her at Aldershot. She had been little altered since she first went into service in 1885. Her original stovepipe chimney had been replaced by a cast-iron one of Drummond's standard pattern; her tender had lost the handrail and footboard with which it had been built and had been fitted with coal-rails. In other respects, she was in nearly her original condition, except that she had been given a boiler with a taller dome than the original one.

No 0148 was built as No 148 in 1885 and was transferred to the duplicate list in 1904, which accounts for the bar under her number. This was the usual LSWR method of numbering duplicate engines at that time; it had the merit of simplicity and was certainly convenient, as it readily identified the engines.

No 0148 was one of 14 of her class



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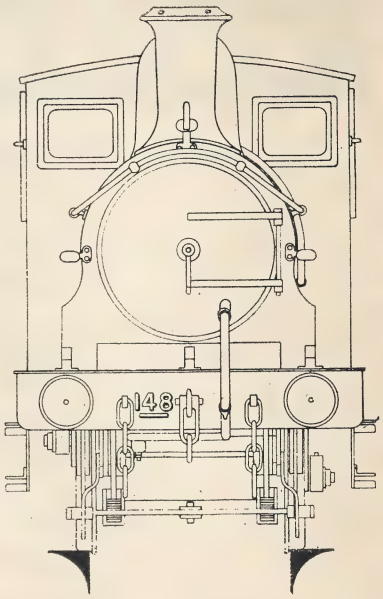


GOODS ENGINES LSWR

By J. N. MASKELYNE

that were sent out to Palestine in 1916—the first batch to go. She was employed on purely military duties while the war lasted, and then, when hostilities ceased in November, 1918, she was taken over by the War Department and was used for rehabilitating the railways of Egypt and Palestine, working out there until 1929, when she seems to have been sold for scrap. I did not see her again after 1914, but a friend of mine, who was in the Middle East during 1924, reported having seen her working on the Egyptian State Railways at Basrah, still carrying her British number.

Usually they run at night "when all decently brought-up boys like me were in bed—or should have been"

No 3509 was an engine of some interest, her animated image must have been seen by many thousands of people; for, in June, 1937, she was temporarily taken out of traffic, fitted with a short LBSCR Marsh chimney, and given a prominent part in that hilarious Will Hay film *Oh, Mr Porter*! To locomotive enthusiasts, No 3509 flaunting that short chimney, was quite as amusing as any of the other characters in the film, and she certainly played her part very well.

These engines, officially designated the 395 class, had cylinders of 17½ in. dia. × 24 in. stroke, inclined at 1 in 9, to clear the leading axle. The wheels were 5 ft 1 in. dia., with a wheelbase of 16 ft 6 in. divided into 8 ft plus 8 ft 6 in. For the engines built before 1885 the leading overhang was 4 ft 9 in.; for those built in 1885-6 it was 6 ft. The rear overhang for all was 3 ft 6 in.

A very good boiler was provided; its diameter was 4 ft 4 in. outside and its length of barrel 10 ft 6 in.; its centre-line was pitched 7 ft above rail level. A rather unusual feature was the sloping front to the smokebox, evidently to avoid an awkward joint with the cylinder block, whose front was inclined. In later years some of the engines were given new smokeboxes with vertical fronts; but most of them retained the old type to the end.

In the boiler barrel were 218 tubes of 1¾ in. dia., of which the heating surface was 1,079 sq. ft.; the firebox added 108 sq. ft, making the total heating surface 1,187. The outer shell of the firebox was 5 ft 10 in. long, and the inner box 5 ft 2¼ in. Grate area was 17.8 sq. ft and working pressure 140 p.s.i.

The tender wheels were 3 ft 9¾ in. dia., and the wheelbase was 13 ft equally divided. At the front the overhangs were 3 ft 6 in., and at the back 3 ft, while the total length of engine and tender over buffers was 48 ft 0¾ in. for the engines built before 1885 and 49 ft 4¼ in. for the later ones. Water capacity was 2,500 gallons.

Between the earlier and later engines the weights, of course, varied. For the earlier, the distribution, in working order, was 12 tons 16 cwt on the leading axle, 13 tons 12 cwt on the middle axle and 11 tons 4 cwt on the trailing axle, a total of 37 tons 12 cwt. For the later engines the corresponding figures were: 13 tons 17 cwt, 13 tons 16 cwt and 11 tons 1 cwt, a total of 38 tons 14 cwt. For all, the tender weighed 28 tons 13 cwt loaded, so that the weight of engine and tender was 66 tons 5 cwt for the earlier lot and 67 tons 7 cwt for the later.

The last survivor, BR 50567 of Guildford, had an old London, Chatham and Dover boiler and an Adams 3,300-gallon tender. ▣

From the posthumous papers of J.N.M.

FIREFLY

Continued from June 1, pages 685 to 687

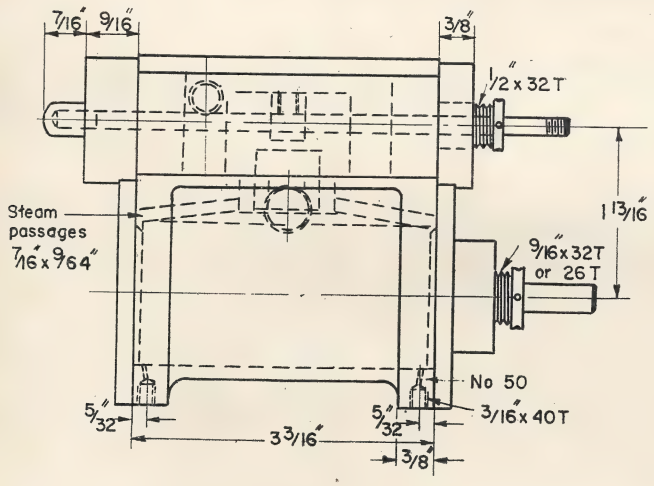
A GWR 2-6-2 TANK ENGINE OF THE 45XX CLASS

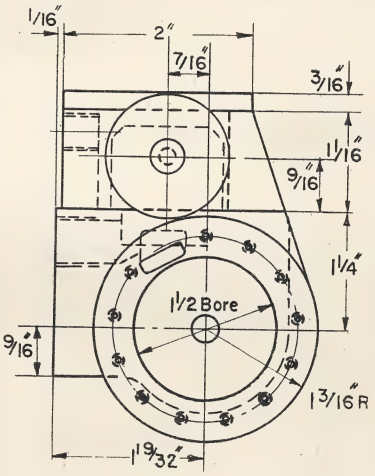
FOR both the 4¾ in. and 5 in. gauge *Firefly* the cylinders are exactly alike. In this size the use of iron instead of gunmetal might be considered.

Opinions on the use of cast-iron for locomotive cylinders seem to differ. If the engine is to be used a good deal, and the owner is prepared to spend time lubricating the cylinders frequently, there is really no objection. If the castings can be obtained in nickel cast-iron, so much the better. Use proper rings and—especially during the running-in period—plenty of oil, with a small addition of colloidal graphite. One big advantage of iron cylinders is that they will stand a much higher superheat temperature than gunmetal cylinders with soft packing.

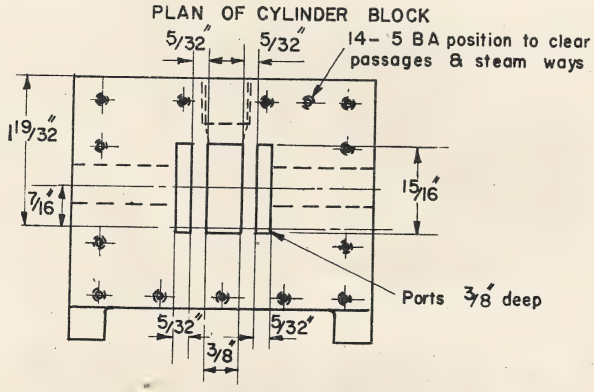
The 5 in. gauge cylinders are very similar to these at ¾ in. scale. They are 1½ in. bore × 2⅜ in. stroke. The steam ports measure 5/32 in. × 15/16 in. and the exhaust ⅜ in. × 15/16 in. Lap is 5/32 in., and maximum valve travel ⅝ in., giving a full gear cut-off of 75 per cent. as in the smaller engine. The valves should be set to have no lead in full gear, but in mid-gear there should be about 1/32 in. lead.

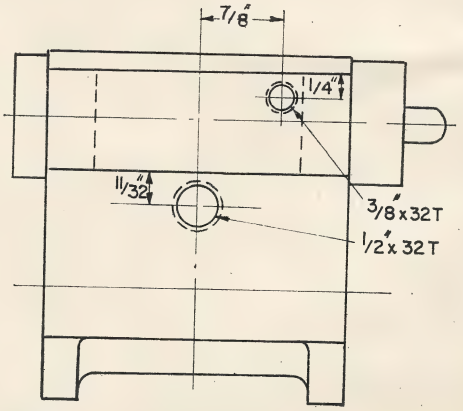
For the steam passageways between ports and bores we have oval slots 7/16 in. × 9/64 in., giving a cross-sectional area of about 0.050 sq. in. This compares with a half port opening of 0.068 sq. in. The piston-swept volume amounts to 3.755 cu. in. and the clearance volume, including passageways, works out at approximately





PLAN OF CYLINDER BLOCK

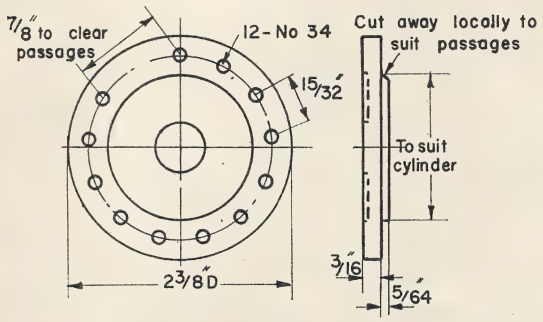




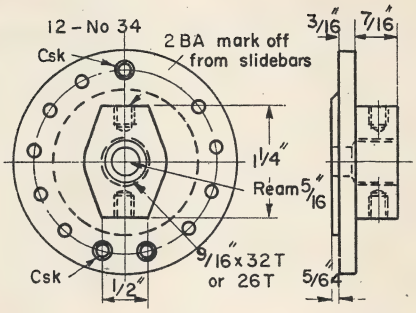
REAR VIEW OF CYLINDER BLOCK AND STEAM CHEST

CYLINDER 1½" BORE 2⅛" STROKE

2 OFF GUNMETAL

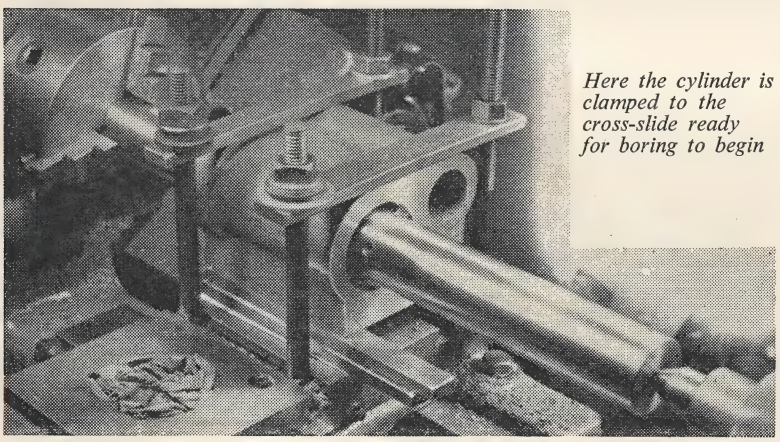


FRONT COVER 2 OFF

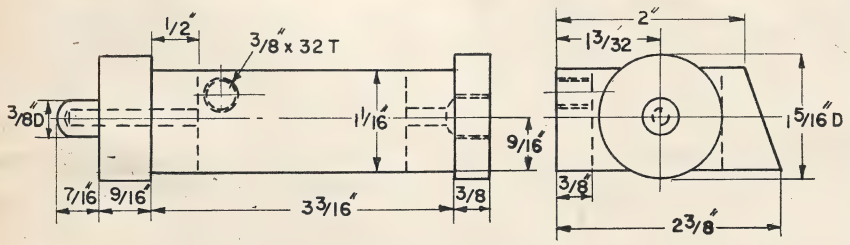


REAR COVER 2 OFF

MARTIN EVANS deals with the cylinder blocks, steam chests, covers, pistons and valves of the locomotive at 1 in. scale



Here the cylinder is clamped to the cross-slide ready for boring to begin



STEAM CHEST

0.22 cu. in.; thus the ratio of the clearance volume to piston-swept volume is 5.9 per cent.

As the cylinder block in this scale is fairly big and heavy, owners of small lathes may not be able to mount it on the faceplate. But they can use the four-jaw to machine both ends of the block to just over the finished length (say 3 13/64 in.) and also to machine the bolting face to finished size.

Select a between-centre boring bar which will pass through the cored hole in the casting with about ⅛ in. to spare, and at the same time be long enough for the cutter to pass right through the casting without fouling the lathe chuck or headstock. It can be very quickly made from a piece of 1 in. dia. steel shafting about 8½ in. long, cross-drilled and reamed ⅜ in. dia. at a point 4½ in. from one end to take a ⅜ in. round h.s.s. cutter. The cutter can be held firmly by a 2 BA Allen grubscrew.

The top slide of the lathe is removed and the cylinder block clamped down, with suitable true packing pieces underneath it to bring the centre of the bore 1 19/32 in. up from the bolting face. Two clamps should be used, put over the outer flanges of the block to prevent any possibility of distortion. The block should be set so as to overhang the edge of the cross-slide very slightly.

When the block has been set exactly square, the end nearer to the lathe mandrel can be machined truly by means of a fly-cutter. Remove just enough to clean the end up, and then you are ready for the boring operation.

The self-act should of course be used, with the finest feed that you have, and the cut be put on by partly slackening the grubscrew and tapping the back of the tool-bit lightly with

BUILT BESIDE THE THAMES

GEORGE WOODCOCK contributes the first of two articles on marine engines from the yards of such pioneers as Maudslays and John Penn

No matter what claims may be made for the Tyne, Clyde or Mersey, from 1820 until about 1870 the Thames led the world in the construction of marine engines. In 1840, out of 70 naval vessels no fewer than 50 were engined by Thames men. This proportion continued until 1870.

Economic factors contributed to the final decline of shipbuilding and marine engine building on the Thames. No one can fail to admire the pioneer Thames-side engineers; the study of their work provides, not merely a review of local enterprise, but the history of the development of the steamship.

Marine engine building in the area began with the construction in 1815 by Maudslay, Son and Field of Lambeth of a small set of beam paddle engines. It ended in 1911 when John Penn and Sons of Greenwich made the engines for the battleship *Thunderer* built by the Thames Ironworks of Blackwall.

When steam was first introduced for marine propulsion it was to be expected that, in the lack of experience, a recognised type of land engine would be used. Leaving aside such experimental work as that of Fulton, Miller and Symington, by 1815 beam and side-lever engines were being built for marine work by such concerns as David Napier and Dobbie of the Clyde, Boulton and Watt of Birmingham, the Butterley Iron Company, and others, including Stephen Vial of New York.

The first known side-lever engines built upon the Thames were those for the paddle steamer *London Engineer* constructed by Daniel Brent of Rotherhithe in 1818. The engines were by Maudslays but they were not of the true side-lever pattern which later became standard; the levers were in the form of bell cranks.

One of the first side-lever engines for naval use by Maudslays was made for the *Lightning* in 1823 with two cylinders, 40½ in. bore × 48 in. stroke. This and some later engines worked at a pressure of only 3 p.s.i. No feed pumps were required. Feed water was supplied to the boilers from tanks placed high enough on deck for the head of water to overcome boiler pressure. The general layout of such an engine may be seen in Fig. 1.

The valve gear was operated from two eccentrics to each cylinder by

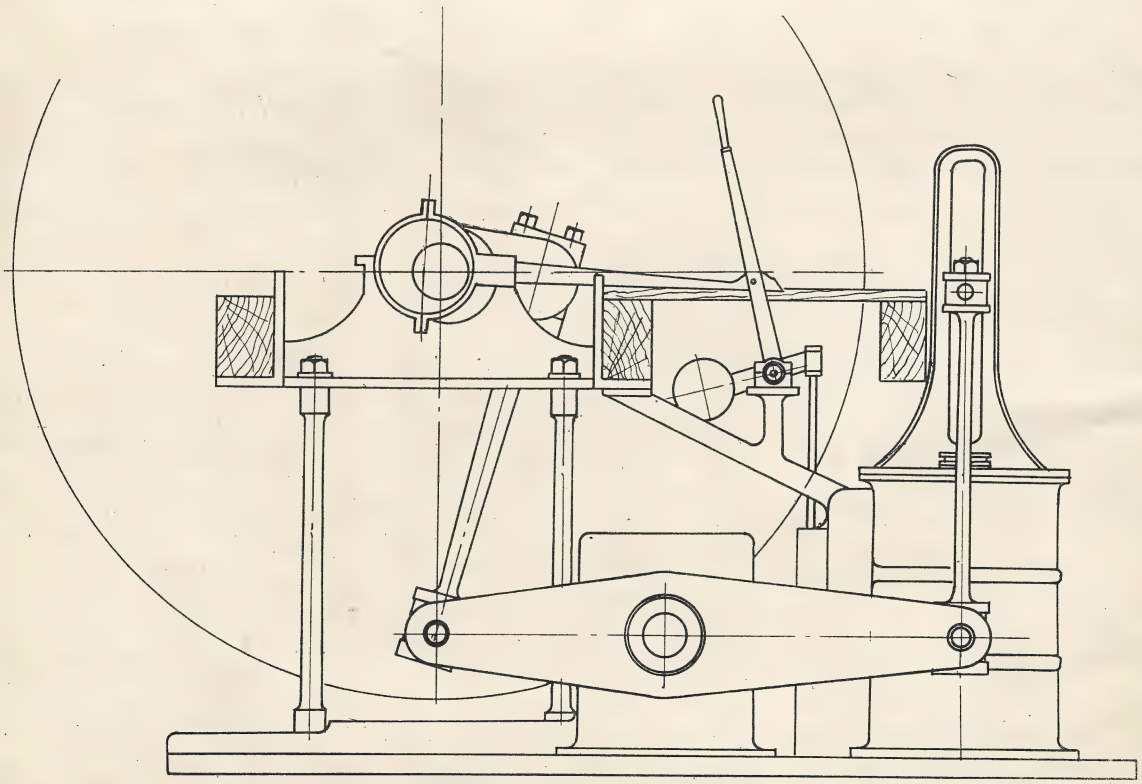


Fig. 1: *Maudslays' side-lever engine of about* 1830

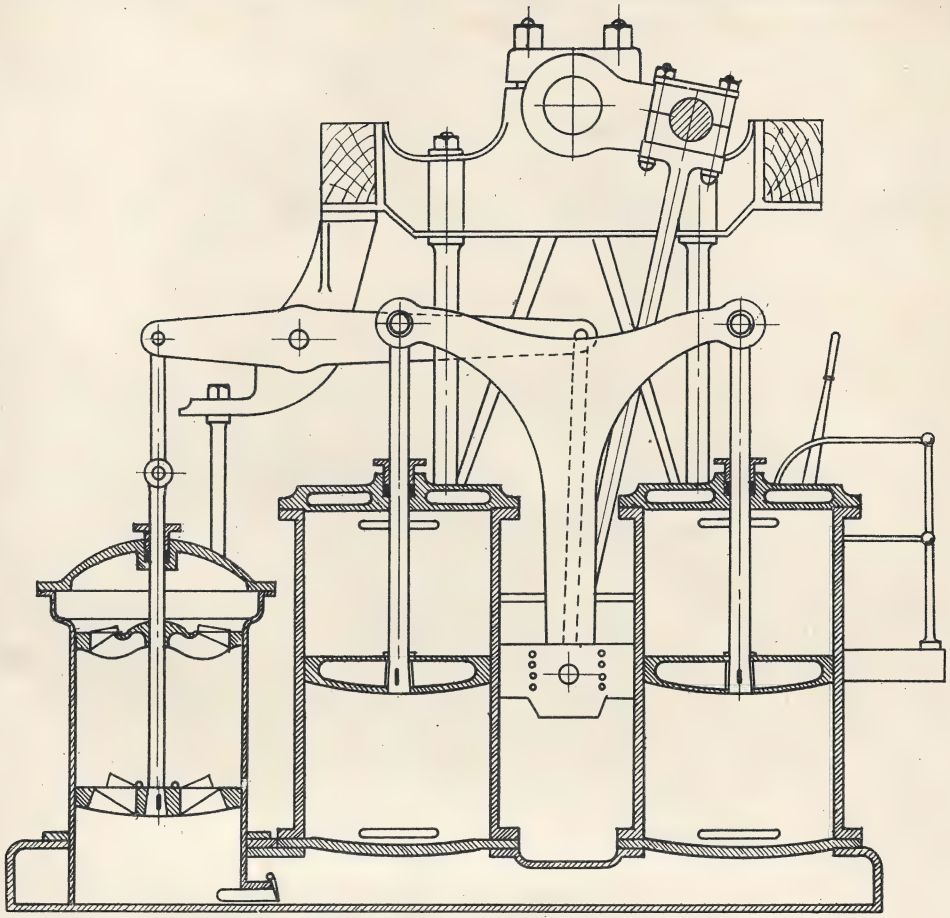


Fig. 2: *Side-lever engines gave place to the Siamese. This is Maudslays' Siamese of* 1839

gabs which could be disconnected for reversing, during which the valves were worked by hand. Another form of gear was one in which the valve rods were operated by cams upon the crankshaft. Here the cams had various profiles, and a roller upon the valve operating lever could be moved laterally to different parts of the cam to effect a small degree of expansive working.

To model an engine of this type would be straightforward, but the model would be cumbersome unless it were made to a small scale. I have found that any marine engine model except the simple launch engine must be built to a fairly large scale to contain the correct amount of detail.

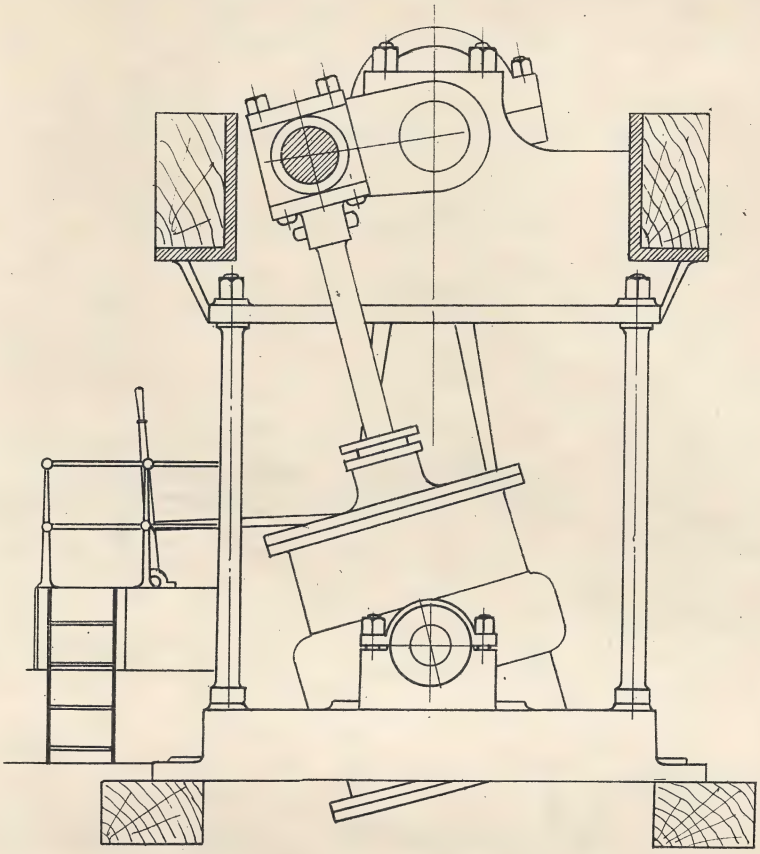
The great drawback to the side-lever engine, which became evident with the growth of size and power for larger vessels, was that an increase in the stroke led to an increase in the height, an undesirable feature in merchant vessels and fatal in naval work. Thus, after 1839 few side-lever engines were constructed; they gave place to the Siamese engine shown in Fig. 2.

Maudslays' engines for Brunel's *Great Western*, built by Paterson of Bristol in 1837, were outstanding examples of the side-lever. They weighed 200 tons, developed 750 horse power, and had cylinders 6 ft 1½ in. bore × 7 ft stroke. The *Great Western* made five double passages across the Atlantic in 1838 and six in 1839 at an average day's run of 215 miles. By 1846 she had made 75 double crossings without major engine trouble—a fitting tribute to her engine builders.

The Siamese engine was introduced by Maudslay, Son and Field in 1839 mainly for the propulsion of naval paddle vessels. It was fitted by them to four large paddle warships, *Scourge*, *Devastation*, *Retribution* and *Terrible*. In *Terrible*, a steam frigate of 1845 —she took part in the bombardment of Odessa—the engines had four cylinders, 6 ft bore × 8 ft stroke, working at 15 p.s.i. and making 16 r.p.m. on the paddleshaft. The horse-power developed amounted to no less than 2,095. This was a great increase in power.

A model of a Siamese would need few castings apart from those for the cylinders and possibly the upper members of the entablature. The air-pumps to the condensers were operated by links from the yoke or crosshead. This was fabricated from plate with spacers, and could be similarly made for a model. Besides giving an increase in power, the Siamese had the advantage of a very long stroke. A long connecting rod is desirable in any marine engine to reduce cross-head slipper wear.

HMS *Rattler*, a sloop built at Sheerness Dockyard in 1843, was the



John Penn's oscillating engine of 1845

first screw-driven naval vessel. Maudslays provided her with a set of Siamese engines of 437 h.p. They were geared to the screw shaft at 4 : 1 up, with a screw of 10 ft dia. by 11 ft pitch revolving at 113 r.p.m. So far as I know, they were the only Siamese engines to be used with a screw. Many were, however, built for paddles.

The valve gear was mainly of the gab or non-expansive type as in the side-lever engines. It was usual to allow up to 1 in. lap to the valves. Both the Siamese and side-lever engine were used with jet condensers.

An oscillating engine, which could be adapted for screw or paddles was introduced by the firm of Maudslays as early as 1827, when a set was fitted to the Thames river steamer *Endeavour* Another Thames-side firm later bought the oscillating engine into general use. *Mersey*, a vessel of the Royal West India Mail Company, built by Samudas at Millwall in 1859, had oscillating engines by Maudslays with cylinders of 5 ft dia. and 5 ft stroke. Steam was admitted by way of the cylinder trunnion to a steam chest and the valves were operated by link motion. Exhaust was through a cored passage around the cylinder and out by the opposite cylinder trunnion.

All engines of this type were outclassed by those built at the Napier Yard of John Scott Russell for the *Great Eastern* of 1858. Here the stroke was no less than 14 ft with a bore of 6 ft 2 in. Four cylinders developed a total of 3410 horse power for a total engine weight of 836 tons. Before very long one of the trunnions broke, and until the end the *Great Eastern* worked on three cylinders only for the paddle engines. The fourth engine was chained back.

John Scott Russell also introduced an interesting oscillating engine with three cylinders placed radially round the crankshaft. He fitted it to the Egyptian royal yacht *Cleopatra* which he constructed and engined at Millwall in 1853. The cylinders were 40 in. × 48 in. Working at 40 p.s.i. the engines developed 882 horse power.

It was through the Greenwich firm of John Penn and Sons that the oscillating engine underwent its greatest development. The Maudslay oscillating engine of 1827 was redesigned by Penn about 1838. He replaced the cast frames with neat turned columns, removed the valve-chests from the trunnions, and worked the valves by rockers which engaged in sweeps running in guides and driven by the eccentrics.

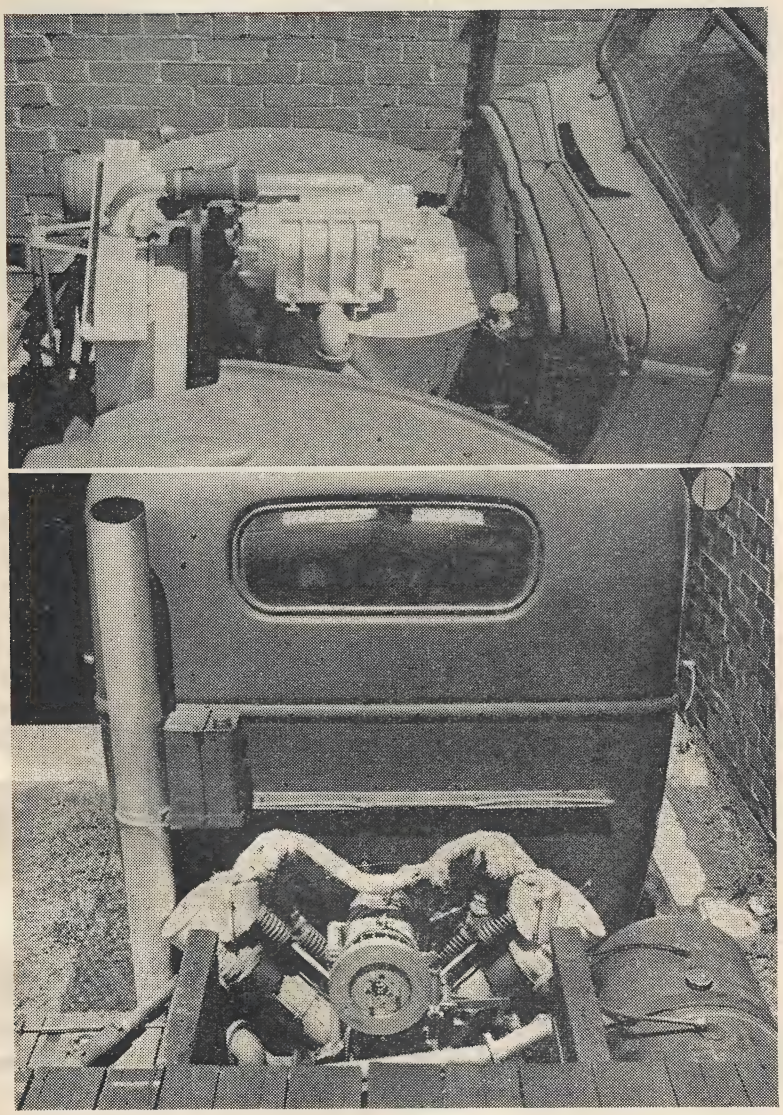
Penn turned out a large number of these engines mainly for paddles and some for screws.

With paddle engines in general, it is usual for seagoing vessels to proportion the cylinder stroke as one-fifth of the paddle wheel diameter. For river vessels which will normally work in smooth water the proportion is altered.

★ *To be continued on June* 29

T. E. BRISTOL writes of a Melbourne power unit which is claimed to equal the modern internal combustion engine in performance

STEAM on the road



Top: Lift a conventional bonnet to see the steam generator, exhaust motor and condenser. Above: Engine crankshaft is coupled to the propeller shaft without gearbox or clutch. The pictures are by Hugh Aldersey of Melbourne

ALTHOUGH the possibilities of steam power for the propulsion of vehicles is a perennial subject for discussion among enthusiasts, very little practical work has been done on its development in recent years. Most professional steam engineers have confined their attention almost exclusively to large power units, and the light, mobile plant has been sadly neglected. It is, therefore, all the more interesting to learn from *Australian Mechanical Engineering* that a Melbourne firm of engineers has produced a new design of steam power unit which has been successfully applied to the propulsion of a 5-ton truck, and is equally suitable for stationary and marine applications.

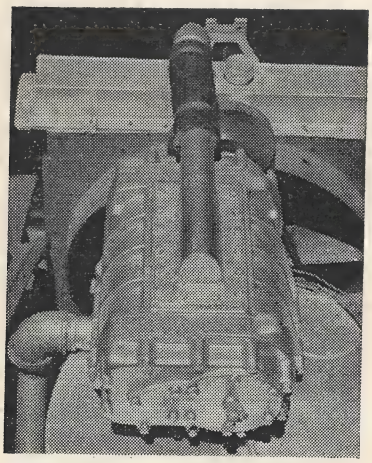
The venture is the joint work of A. M. and E. Pritchard, and was undertaken to produce a plant of high power-weight ratio, with a performance comparable to that of the modern i.c. engine, minimum delay in starting from cold, and the use of cheap, convenient fuel, together with simplicity of control, durability, and ease of manufacture. Their claim to have satisfied all these requirements has apparently been confirmed by bench and road tests.

While much of the design follows principles which have been employed by earlier steam car designers such as Serpollet, White and Doble, there is a distinct breakaway from convention, and a good deal of originality, in some of the features. The boiler, of the monotube or flash type, esembles that of the Doble car superficially, but differs from it in many respects. It is fired from the bottom and the flame travels vertically upwards, spreading outwards at the top; the hot gases then flow downwards through the generating coils, to be discharged through a flue underneath. Feedwater enters the coils at the flue end and, after traversing the

coils both upwards and downwards, is delivered near the burner as superheated steam at 800 to 1,000 p.s.i. At the sides and top of the boiler casing, closely-wound feed coils form water walls which reduce wastage of heat, and relieve the duty of the insulating material used for internal lagging of the sheet metal. The generator tubes are tested to 4,000 p.s.i. hydraulic pressure.

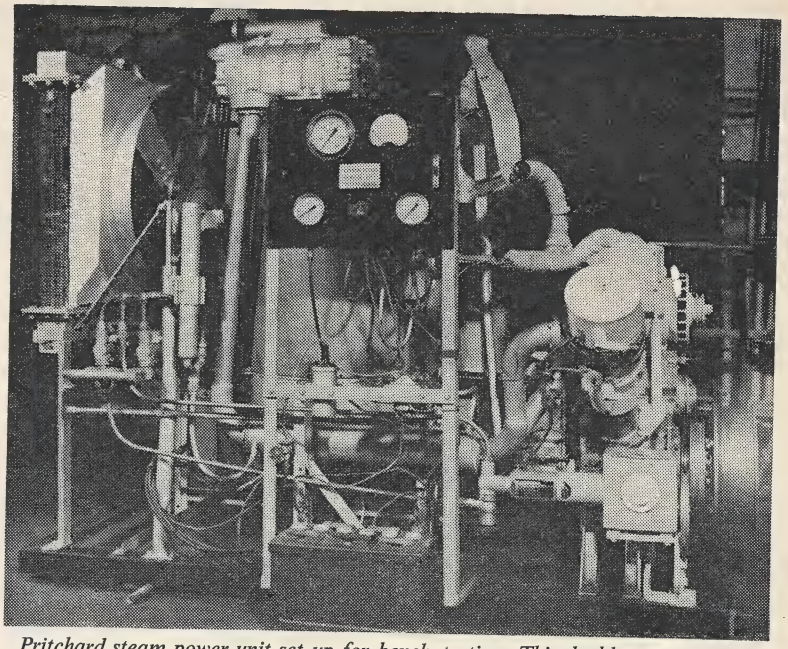
Instead of the more or less conventional piston valve engine favoured by most steam car designers, the engine is of the 90 deg. V-twin double-acting uniflow type, with push-rod operated poppet valves for steam admission only. These are actuated from a single sliding camshaft; graded cam lobes provide for cut-offs of 80, 40 and 16 per cent in forward gear, and 80 in reverse. Exhaust is by ports in the centre of the cylinder barrel, which are uncovered by the piston at the alternate ends of the stroke. To avoid trapping condensed steam, the cylinders are fitted with both automatic and manually-operated relief valves.

The poppet valves and piston rods are of stainless steel, and the piston



With a positive displacement exhaust motor to drive the feed pumps and fan the feed rate is balanced with the power developed, regardless of engine speed

rods have crossheads of hardened steel which work in trunk guides with removable Meehanite liners. Both the crankshaft and the chain-driven camshaft run on ball and roller bearings, and the single big-end bearing comprises a parallel roller bearing whose outer race forms the bearing for the two connecting rods, one of which is forked, so that the cylinders can be located on the same lateral centre line, instead of being staggered, as is more usual in V-type engines. It is thus necessary to use a built-up, detachable crankshaft assembly.



Pritchard steam power unit set up for bench testing. This double-acting V-twin engine develops 100 *b.h.p. at* 2,000 *r.p.m. and has a maximum torque of* 1,500 *lb. ft. says* Australian Mechanical Engineering *of February* 6, 1961

The cylinders are 4 in. bore × 4 in. stroke, and the connecting rods are 10 in between centres; this unusual length reduces angular and side thrusts and also secondary unbalance. The 90 deg. V-twin arrangement has no unbalanced couples, and primary forces can be completely balanced by counterweights, to give very smooth running.

It is interesting that steam engine experts generally regard the uniflow engine as unsuitable for traction purposes, as it is considered inflexible, and critical on load and pressure; but here it appears to be entirely successful. The engine is direct coupled to the transmission system, needing neither clutch nor gearbox. It develops 90 to 100 h.p., at an estimated maximum speed of 2,000 r.p.m. and maximum torque of 1,500 lb. ft.

Ignition for the pressure atomising oil burner is provided by a standard motor car coil, which produces a spark between heat-resisting steel electrodes with a $\frac{1}{8}$ in. gap, in the path of the oil spray. The fuel pump, forced-draught fan, and ignition contact-breaker are driven by a 24 v. motor, and controlled by a thermostatic switch, while a second thermostat serves as a safety device if the water supply fails, or if there is danger of overheating for any other reason.

The feed pumps are driven by a low-pressure rotary motor, operating on exhaust steam from the engine. In this way, the rate of feed is proportional to the rate of feed consumption, irrespective of the variations of load and speed encountered by the engine in different driving conditions and on different gradients. The motor a Rootes blower, serves also to drive the fan for cooling the condenser (a large finned-tube radiator), in proportion to the duty required.

To start the plant working, a dashboard switch is used to turn on the burner equipment, and steam is raised in 90 to 100 seconds. Control of steam generation is thereafter automatic, pressure being regulated by a diaphragm valve or pressurestat. The weight of the complete plant is 800 lb., of which the steam generator accounts for 500 lb. and the engine for 300 lb.

Before being installed in the truck, the plant was bench tested under light load, and it was found desirable to enlarge and modify the design of the burner; a combustion chamber and burner assembly similar to that of a gas turbine was finally adopted. In road testing, a few other teething troubles developed, including burner instability, ascribed to gas resonance, and propeller shaft vibration, remedied by fitting a torsional friction damper. Other minor faults, such as fluctuation of steam pressure and temperature, have called for some modifications to the controls, but the general results have been highly promising.▣

READERS' QUERIES

DO NOT FORGET THE QUERY COUPON ON THE LAST PAGE OF THIS ISSUE

This free advice service is open to all readers. Queries must be within the scope of this journal and restricted to one problem. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling cannot be given: stamped addressed envelope with each query. Mark envelope clearly "Query," Model Engineer, 19-20 Noel Street, London W.1

Injectors

May I say how very much I enjoy reading ME? I find it a very great help indeed.

If I can make one suggestion, I would say that a great service to model locomotive builders would be to produce just one article giving drawings of injectors suitable for 3½ in. and 5 in. gauges. I have checked back over the years only to discover that LBSC's so-called standard injector varies in design quite frequently and that the descriptive matter does not agree with the drawings in many instances. I am not saying this in an attempt to find fault with the legendary LBSC, bless him, but I am reluctant to spend what little time I have in making a useless accessory—hence my plea for a final standard dependable design.

Wishing you many more years of success with ME—W.R., Kirkintilloch, Scotland.

▲ *Your suggestion will be borne in mind and suitable drawings may be included in the* FIREFLY *series.*

Gauge 1 Duke

Would you kindly let me know of a source for gauge 1 locomotive castings? I have in mind the building of a GWR Duke, similar to *Comet* [J.N.M., October 1959].

Fabrication could largely get over the casting difficulty except for the wheels—5 ft 8 in. (18 spoke), bogie 3 ft 8 in. (10 spoke) and tender 4 ft 2 in. (12 spoke).

I think it should be possible to have two cylinders with valves under them, using Joy valve gear.—F.E.D., Findon, Sussex.

▲ *No source is known here for the gauge 1 wheels you require, but you could write to Messrs P. E. Thomas of 123 Lower Richmond Road, Mortlake, SW14, who might have something suitable, or might be prepared to make patterns to order.*

Joy gear should be quite satisfactory for your proposed gauge 1 GWR Duke. You might find it more convenient to have the valves on top of the cylinders with this gear, provided that there is sufficient room for the weighshaft below the boiler.

Drilling machine motor

I wish to motorise a bench top drilling machine by removing the jockey pulleys and so forth, and mounting a 1,425 r.p.m. motor at the top rear. The driller is a light industrial machine, No 1 MT, with plain cast-iron bearings, and has an uncaged ball thrust bearing.

Would a ¼ h.p. motor be suitable? Would the motor have to be of a special design for mounting in the vertical position? Would two ½ in. V four-step pulleys of 2⅜ in., 3⅜ in., 4⅜ in. and 5⅜ in. outside diameters, give a suitable range of speeds?—C.P., Walsall, Staffordshire.

▲ *A ¼ h.p. motor running at* 1,425 *r.p.m. would be quite suitable.*

If the motorshaft is mounted in plain bearings, it will be highly desirable to fit some form of thrust bearing to take the weight of the rotor and driving pulleys. This can take the form of a standard ball thrust race inserted between the bottom of the driving pulley and the bearing housing of the motor, provided that the faces of both are flat and true.

Four-step pulleys of the sizes specified would give quite a good range of speeds for general purposes.

Steam ports

I am building a small horizontal steam engine, ½ in. bore and ¾ in. stroke.

I am doubtful about the size of the steam ports, and also about the piston clearance in the cylinder. I have been looking through some of my back numbers of MODEL ENGINEER, but most of them describe larger cylinders than ½ in. × ¾ in. Please will you tell me if these sizes would be right: steam ports 1/16 in. wide and 5/16 in. long, exhaust port ⅛ in. wide and 5/16 in. long, and clearance of piston in cylinder 1/16 in. each end of the stroke?—J.B., West Kensington, London.

▲ *The dimensions which you suggest would appear to be quite suitable, but you are advised to make the drawing of the port face and the slide valve to a fairly large scale to check valve operation, as this will help considerably in setting out the timing of the valve events to obtain the best efficiency.*

The exhaust cavity of the slide valve should exactly bridge the inner edge of the cylinder ports, and the outer edges of the valve should overlap the outer edge of the ports by an amount equal to the lap at both ends. A diagram of this kind will show how much valve travel should be allowed for full opening of the ports.

Lap and lead depend on several factors. For your purposes, about 1/32 *in. lap at each end is suggested. In setting the eccentric, the angle should be adjusted to give just barely perceptible opening of the ports at the dead centres.*

If you wish for further explanation of slide valve operation, the handbook Model Stationary and Marine Steam Engines (*PM*, 9*s.* 6*d.*) *will give you all the information required.*

For the clearance of the piston at the ends of the stroke, 1/16 in. will give fairly satisfactory working, but it may, with advantage, be reduced, as it is always desirable to have the smallest possible clearance in steam engine cylinders.

For model trains

I recently obtained a copy of *Model Railway Illumination*, by E. F. Carter. Chapter 5 says nothing about the size of wire to be used or the number of turns for each of the coils L1 and L2 in Fig. 30. The capacities of the two condensers in the same diagram and the value of the condenser in Fig. 32 are not mentioned.

As I want to construct the

Model Engineer EXHIBITION

The next Model Engineer Exhibition will be held at the Central Hall, Westminster, opposite Westminster Abbey, from 16-26 August 1961, excluding Sunday.

Anyone wishing to enter a model, or other piece of craftsmanship, should write to the Exhibition Manager, Percival Marshall Ltd, 19-20 Noel Street, London W1, for an entry form.

component for my model railway, I would be grateful if you could give me the necessary information.—J.S.W. Plumstead, London.

▲ *Two bobbins will be required, each measuring* 1½ *in. dia.* × ⅝ *in. in width; the winding space should be* ½ *in. wide* × ½ *in. deep. There must be no iron core to these chokes.*

Each coil will be wound with 170 *turns of* 20 *s.w.g. plain enamel covered copper wire. Hard wood or vulcanised fibre is suitable for the bobbins.*

The condensers are a variable factor, and their capacity is governed by the current to be passed. Those for the HF unit output can be 2 *to* 4 *mfd. The condensers for a group of lamps of three in parallel should have a capacity of* 1 *mfd. as a minimum. The condensers should be the ordinary paper ones, not electrolytic.*

No parallel finish

I have recently bought a Zyto 3⅝ in. lathe in rather poor condition, but with new bronze bushes in the headstock bearings. I find that in turning pieces held in the four-jaw chuck I cannot get a parallel finish. The tool is traversed by the self-act, and the saddle and cross-slide gibs are adjusted not to give any play.

I have come to two conclusions. The first is that the tool is wearing slightly during each cut, which does not seem likely to produce an error of about 3 thou an inch; and the second is that the headstock is not aligned accurately with the lathe bed. I would be grateful for any suggestions which you may be able to make.—R.N.B., North Wembley, Middlesex.

▲ *Presumably the alignment of the mandrel bearings with the slides of the bed is in error. It is extremely unlikely that tool wear would account for the error of parallelism of* 3 *thou per inch, assuming that the tool is correctly tempered and ground, and the material is of normal machining quality.*

Some of the earlier Zyto lathes apparently had the headstock cast integral with the bed, and it would be extremely difficult to correct any error in the alignment of the bearings except by the tedious method of scraping the bores of the bearings out of centre, and fitting an oversize mandrel.

With lathes which have a separate headstock casting, it is generally possible to make some adjustment of the alignment. Where locating tongues are fitted to the headstock base, this could be done by filing the sides of the tongues and fitting adjusting screws in the bed to move them as required.

It should be fairly simple to adjust the headstock alignment in this way so as to show no measurable error in a 2 *in. length of bar of sufficiently heavy section to eliminate the possibility of spring. The test of alignment should of course, be made before attempting to correct any other errors which may exist in the slides or the tailstock.*

Bed of South Bend

I am the owner of a South Bend lathe, whose bed is badly worn in the centre on all four V-ways. Could I get the bed reground and would this be the most practicable thing to do ?—D.M.S., Duddington, Lincolnshire.

▲ *It would be practicable, as you suggest, to recondition the lathe by getting the bed reground. Several firms specialise in the reconditioning of machine tools, but they deal almost exclusively with industrial types of lathes, and it is extremely probable that the expense of regrinding a small lathe bed would be prohibitive.*

An alternative method would be to recondition the bed by hand scraping, but this would probably be a tedious operation if the inaccuracy is very considerable.

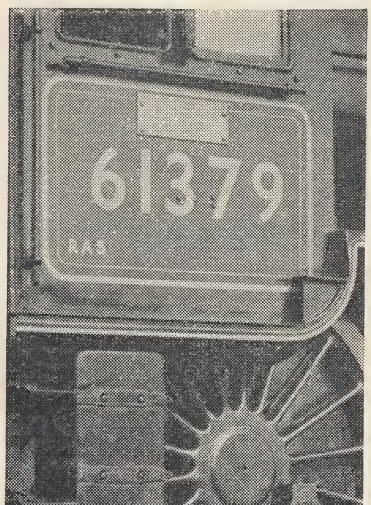
Can You Help ?

Readers who can offer information to those whose queries appear below are invited to write c/o Model Engineer. Letters will be forwarded.

Locomotive names

Writing on the NB Atlantics [April 27] Robin Orchard gave one of the names as *Dundonian.* While this name was originally suggested for No 869, it was not actually used, the engine being named *Bonnie Dundee* instead. Later in the article the name of No 902 is given as *Highland Chieftain.* While this style was used for the Thompson A2 Pacific, the Atlantic was *Highland Chief.*

The names of the first 14 engines put to work in 1906 were given in geographical sequence from North to South of the territory served by the NBR. For anyone interested I would recommend an article published in *The Railway Magazine* for January 1935.



I would also like to reply, rather belatedly, to the comments by Martin Evans in reply to my letter on the livery of the ex-GCR 4-6-0s [December 18]. Classes B1 and B2 (later reclassified B18 and B19) and B3 and B4 were among those painted green after 1928; they continued to be green until the livery was abandoned in November 1941. Engines of all four classes were frequent visitors to Leicester during this period.

Other classes which remained green between 1928 and 1941 were: A1; A3; A2 (Raven); B12 (except those painted at Inverurie); B17; C1; C6; C7; C7/2; C9; C11; D16 (Nos 8783, 8787 and 8900 only); D49; K4; P2; V2; V4; X1; X2; X3; the NE Electrics No 3 to 13; and the Gresley Electric No 6701.

A4s Nos 4482 to 7/93-5, when new, were painted green until garter blue became standard for this class in October 1937.

I wonder whether any of your readers could answer two queries for me on LNER engines ?

A4 No 60024 *Kingfisher* appears to carry a plaque fixed to the boiler, and I would be interested to know just what it represents, and why it is carried.

B1 No 61379 *Mayflower* carries a plate on the cab sides explaining the association of its name. I would like to have the wording.

—P.A.S., Leicester.

[*Robin Orchard writes: C. Hamilton Ellis, in* The North British Railway, *implies that the names were carried.* —EDITOR.

POSTBAG

The Editor welcomes letters for these columns. A PM Book Voucher for 10s. 6d. will be paid for each picture printed. Letters may be condensed or edited

FAST AND SLOW

SIR,—The term " big or little wheel " [Postbag, May 4] was never used among the old drivers to my knowledge.

It was always the " fast and slow wheel." After a day's work, and returning home with empty trailers (or trucks) as they were often called, one heard the old cry: " Put her in the long leg, boy." This meant " fast wheel " up hill as well as along the flat—except, of course, when a steep hill was encountered, and the slow wheel would be engaged.

Orpington, Kent. F. J. FINN.

FROM THE PAST

SIR,—May I please add my support to Mr James S. Reid's request for a reprint of Henry Greenly's articles on 3 in. scale traction engine construction ?

I should also like to ask if publishers—including Percival Marshall—could be persuaded to reprint some of the excellent books on traction engines and model construction which now, alas, are out of print.

I refer particularly to *Traction Engines Worth Modelling* and to R. H. Clark's books on traction engine builders.

Isleworth, R. A. COPP.
Middlesex.

D-VALVE

SIR,—I do not think that the method advised for setting the valve in the reply to J.R.A.L. [Queries, April 27] can be carried out with *Mollyette*. The valve-chest and cover are made in one piece by a milling process, and even if a separate valve cover were to be substituted, it still would not be possible to view the valve in action as it is necessary to have the left-hand frame-member in position, at any rate temporarily, and this covers the valve-chamber.

I spent many hours with mine, using the temporary air-connection advised by the designer, but I found that the piston-rod shot in and out (as he described) equally well at various adjustments of valve-rod length. Possibly I may have had some error in the very small parts, the spacing or the eccentric throw, and possibly they may have acted cumulatively, but on the whole, and taking into account the difficulty of quartering the wheels after, and not before, the assembly into the frames, I found this supposedly simple little engine a doubtful choice for beginners.

Seaton, Devon. B. F. ROBINSON.

MIDLAND COMPOUNDS

SIR,—Martin Evans in " Piston or Slide " [Postbag, April 27] says that the Midland Compounds had piston valves on the outside l.p. cylinders. In fact they had slide valves on the outside l.p. cylinders and an outside admission piston valve on the middle h.p. cylinder.

They had an auxiliary steam pipe to the l.p. steamchest so that the engine, in starting, worked as a two-cylinder simple engine on saturated steam.

Wellingborough, Northants. A. G. CLARK, (BR Driver).

Martin Evans writes: This was a slip on my part; as Mr Clark says, the inside cylinder of the Midland Compounds had a piston valve, the outside being slide valve.—EDITOR.

TRAINING BRIGS

SIR,—Can you tell me where I can buy close-up photographs of training brigs used in the Roval Navv during the latter part of the nineteenth century ? I am particularly interested in deck views and details of fittings and guns. I have already tried the National Maritime Museum, The Imperial War Museum and the Nautical Photo Agency without much success, as they have virtually the same pictures, all taken at such a distance that little detail can be seen.

While writing this letter, I want to take the opportunity to express my admiration—and wonder !—at your efficiency in turning out such a splendid publication week after week. I can appreciate the work that goes into it.

Please accept my very good wishes for many more years of success.

Nautical Research Journal, Brooklyn, NY. ROY ROGERS.

STEAM YACHT

SIR,—I was pleased to read about the steam yacht [Queries, April 27] being built by M.T. of Stevenage. I have one that is the same size as his, with fine lines fore and aft. She completed her steam trials recently.

I borrowed the plant from my drifter-trawler, as I found that it fitted the yacht perfectly, without even bending a pipe. The engine is a S.10, with water-tube boiler, fired by an Optimus roarer burner. There is a boiler feed pump $\frac{1}{4}$ in. bore and stroke, and a hand pump. The propeller is three-bladed and $3\frac{1}{4}$ in. diameter.

She carries $3\frac{1}{2}$ lb. of lead to bring her down to the correct water line. I think a centre-flue boiler, with its low weight, would do away with the lead.

The top works are simple for the time being—two tall masts, a tall funnel, a saloon-cum-wheelhouse, an engine room, a skylight and, of course, a bowsprit. Decks are marked to represent planks and are lightly varnished. The hull colour is white for the freeboard, and green below.

This yacht will represent the 1910 period. I shall look around the museums for details later. The performance is very pleasing—fast with good steering in all weathers. She rolls like the full-size craft. The hull is very old and is carvel built. It was passed on to me, and I am pleased to be able to use it.

We do not see many shapely ship models now. They are mostly launches fitted with diesels.

Highgate, London. D. S. MACLELLAN.

YAYNANJAUNG

SIR,—Readers of the articles on the Burmah Oil Company's tanker *Yenangyaung* may as well know how the name should be pronounced, as it is so often pronounced wrongly.

The name means " Smelly-water Creek " (smelly-water is oil), and is composed of *Ye* for water, *nan* for smelly, and *Chaung* or *jaung* for creek.

People may be forgiven for thinking that the ' g ' in the middle of the word

goes with the 'n' preceding it. In fact it is the 'gy' which goes together; it sounds like our 'G' in "George."

The word is pronounced *Yay-nan-jaung*. The emphasis, if anywhere, is on the last syllable.

Lymington, Hampshire, (formerly of Burma Railways). E. V. M. POWELL.

MICROMETER

SIR,—Mr John A. Creyer, of Shipley, [Postbag, April 20] may be interested in an article "Evolution of the Workshop Micrometer" in *The Engineer* of July 29 last. It gives a very good account of the development of micrometers. If Mr Creyer is unable to obtain a copy I shall be glad to lend him mine.

Accrington, Lancashire. TOM BRIGGS.

STILL EXISTS

SIR,—The firm of Fulman Electric Furnace [Queries, February 23] is still in existence. Its address is: E. Caldwell, Fulman Electric Furnaces, 5 Sherwood Road, Liverpool 23.

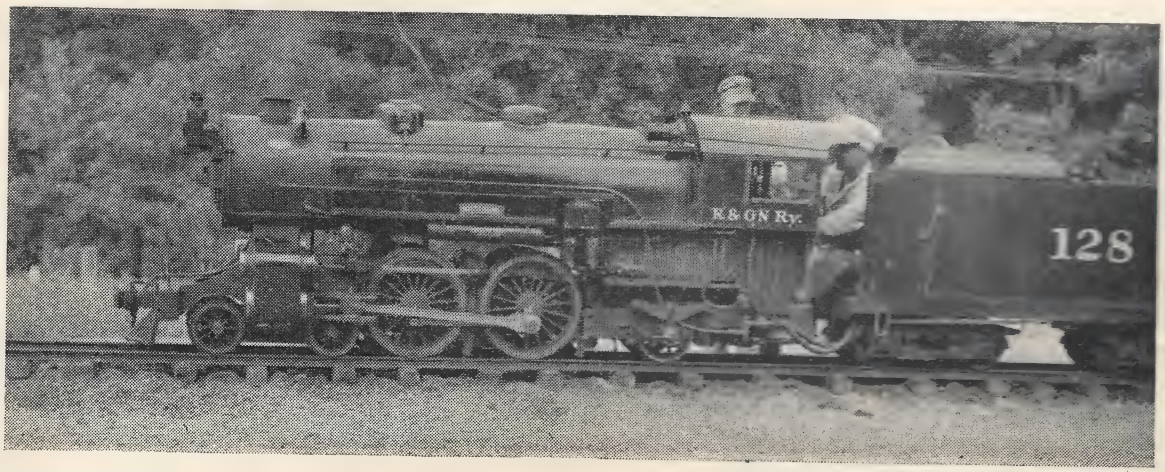
Coventry. V. H. GREY.

WISCONSIN LINE

SIR,—The cover illustration on MODEL ENGINEER for April 20 was quite startling to me because of its similarity to a picture which I had taken on the Riverside and Great Northern.

My other picture shows No 128, a 4-4-2 Atlantic of the Riverside and Great Northern, a 15-in. gauge line at Wisconsin Dells, Wisconsin, USA, with whistle blowing and safety valve popping as it approaches the East Station Terminal with a six-car train.

Winnietka, Illinois. DAVID R. BAIR.



Above: MODEL ENGINEER'S *cover picture on April* 20 *was a delightful study of No* 1 TAL-Y-LLYN *and No* 4 EDWARD THOMAS *double-heading a train along the leaf-embowered line near Dol-goch in North Wales. David R. Bair in Illinois found it quite startling in its resemblance to this picture which he had taken on the Riverside and Great Northern, a* 15*-in. gauge line at Wisconsin Dells. Below: No* 128 *approaches the East Station terminal on the Riverside*

LONG LAPS

SIR,—I have read Mr Arthur H. Binning's letter [Postbag, April 20], with great interest. Of course, a great deal of what he says is true, but Churchward *did* reintroduce long valve laps to locomotive practice and Gresley *did* adopt the valve events of the Churchward standard designs *in toto*.

I fancy here that Mr Binning does not quite realise what I mean by this. Churchward aimed at the minimum cylinder clearance, and to this end used flat-ended box pistons screwed on to their rods, without nuts, so that the covers could be quite flat and a piston clearance of only $\frac{1}{4}$ in. at each end could be used without risk. Now, if one wants to use short cut-offs with a small clearance, the lead must be small, even with large laps. Gresley was the only one to follow Churchward in this. Elsewhere the adoption of long laps was always with leads at least twice that of his $\frac{1}{8}$ in.

Even Stanier did it, first with a fairly small clearance, though the Duchesses have a clearance of $12\frac{1}{2}$ per cent.

It is true that before 1922 nobody but Churchward and Maunsell gave any signs of knowing what long valve laps meant. The work of Conner, Sinclair and the Beatties had been long forgotten, and so had the work of Dugald Drummond in completely spoiling Conner's 8 ft 2 in. singles by cutting off some of the lap so that the lead could be increased.

British locomotive engineers of the past were not very highly trained, technically. Many produced very successful engines, but they did not know much about the fundamentals. I doubt if Churchward was really scientific, but he made it his business to know what was going on elsewhere and he had a genius for picking and using the best things for his purpose. Chapelon also had this urge to find out from others, as is well shown in his book *La Locomotive a Vapeur*.

Cooden Beach. C. M. KEILLER.

A3PS ?

SIR,—May I say how wholeheartedly I agree with the sentiments of Mr R. A. Ferguson in MODEL ENGINEER of April 20, on the non-preservation of an A3 Pacific by British Railways ?

The decision not to save one is totally incomprehensible when the list of reasons in favour is reviewed.

As class A1 the engines were the first Pacifics to be built in this country for service (*The Great Bear* was really a gimmick); as A3 class *Papyrus* pushed the speed record to 108 m.p.h. They have recorded some prodigious feats of haulage—for example, 22 coaches fully loaded out of King's Cross without assistance.

They were the trial ground for the A4 design. Finally, they must surely be the most good-looking of all the big engines, with their beautiful clean boiler outline, delicate tracery of valve mechanism, and elegant curves to the running plates.

It seems unbelievable that they must all fall to the oxy-acetylene torch. In these days of preservation societies, why not a society for an A3 ?

Peterborough, Northants. F. P. ROBINSON.

AFTER DUSK

SIR,—In Postbag of April 20, Mr J. Robert Furlong, of Merioneth, mentions a Foden wagon fitted for generating current. Perhaps he would tell us for what purpose this electricity was generated.

I can recall a Foden steam wagon fitted with dynamo and forming a travelling cinematograph projector run for advertisement purposes by Horatio Bottomley's *John Bull*. This would be about 1908. I have distinct recollection of attending a free show it gave in the market place of Enfield in North London.

As far as I recall, the dynamo was ahead of the chimney, belt driven from the flywheel. The projector in the van behind put the picture on to a large screen erected in the open air after dusk set in.

One or more comedy and topical films were shown followed by others on matters which *John Bull* was always taking up, and then by an advertisement for *John Bull*

I would be interested to know if any other of your older readers can recall this early travelling Bioscope show which definitely involved the use of a Foden overtype steam wagon and dynamo.

Darlington. C. R. HINCKES.

[*These shows after dusk must have been a little like the open-air cinema performances beside the great highways of modern America.*—EDITOR.]

FIREFLY *Continued from page 748*

carefully to avoid the steam and exhaust holes, valve spindle, and steam passageways.

For the valve spindles use 5 in. lengths of $\frac{3}{16}$ in. rustless steel, with a short length of 40 thread at one end for the valve crosshead. At the other end, a 0.010 in. flat is filed to prevent water from getting trapped in the front extension boss of the steam chest.

Although drawn phosphor-bronze or gunmetal is the best material for the slide valves, a casting could be used at a pinch. If drawn bar is adopted, the nearest commercial section is, I think, $1\frac{1}{4}$ in. $\times$ $\frac{7}{8}$ in. or 1 in.

Mill the recess first. Set the machine vice up on the vertical slide and arrange it to face the lathe mandrel. An $\frac{1}{8}$ in. dia. end-mill will do the recess, which should be 9/32 in. deep. Follow up with a larger end mill, say $\frac{5}{16}$ in. or $\frac{3}{8}$ in. dia., to mill the outsides. The two slots can be put in with $\frac{3}{16}$ in. and $\frac{3}{8}$ in. end-mills. To machine them, the valve blank can be brought sufficiently clear of the vice jaws by the usual steel packing strips. Do not use $\frac{3}{8}$ in. thick material for the driving nuts, as it will almost certainly be sloppy in the end-milled slot. Mill them down from $\frac{1}{2}$ in. square material.

The hole through the driving nut is carefully reamed $\frac{3}{16}$ in. dia. and the nut is held to the valve spindle by a 2 BA Allen grubscrew. Do not tighten this now; when the valves have been set, a small flat can be filed and the grubscrew tightened well down. Then it will not shift.

I find this method of valve driving much superior to the old method of threading the spindle. It not only means less work; it also allows really accurate valve setting independently of the position of the valve crosshead to the spindle. The front support for the valve spindle, too, will be found much better than the old method of supporting the spindle by the gland, with the result that slop develops after a few days' running.

While 1/64 in. Hallite sheet may be used between the cylinder block and steam chest, and between steam chest and top cover, oiled brown paper is satisfactory. Being a good deal thinner, it makes no appreciable difference to the distance between the piston rod centre-line and the valve spindle centre-line. For the front and back cover, I prefer the Hallite; the extra thickness need not worry us here.

My picture shows a 5 in. gauge cylinder block set up on the cross-slide for boring. It is actually a piston valve type, as can be seen, but the arrangement is much the same for a slide valve cylinder.

With the next instalment we shall reach the crossheads and slide bars and the special arm to drive the crosshead pump.

★ *To be continued on July 29*

CLUB NEWS

Send news and notices to The CLUBMAN, 19-20 Noel Street, London W1.

TWO MORE

DURING the past few months I have been asked by many readers if the Weald of Kent Traction Engine Club is holding a rally this year. Apparently the rally last year was a great success. I thought that perhaps the club had decided not to hold one in 1961. But I am now told that one has been arranged for August 6.

The site will again be the 1914-18 war aerodrome at Penshurst four miles outside Tonbridge on the main B2027 road. It is also served by the Redhill-Tonbridge line of the Southern Region and by a bus service working out of Tunbridge Wells.

I have news of a rally in Shropshire, at Church Stretton on August 7 (Bank Holiday Monday). Church Stretton is 12¾ miles SSW of Shrewsbury and is served by British Railways Western Region. Owners of traction engines, fairground organs or steam wagons in the area are invited to communicate with Mrs G. Hurdley, 163 Watling Street, Church Stretton, Shrewsbury.

PADDLE PILGRIMS

There are now only two steam paddle tugs left in the service of the Admiralty, HMPT *Pert* and HMPT *Camel*. On Saturday the Paddle Steamer Preservation Society offers ME readers the opportunity to view one of these vessels and to have a trip in one. It is probably their last possible chance.

The tugs, which are stationed at Devonport Dockyard, will soon be following the path of HMPT *Swarthy* and HMPT *Sprite*.

Travelling overnight to Plymouth by the 11.50 train from Paddington tomorrow, the ship lovers will arrive at 7.33 a.m. Saturday morning. At 9.30 a.m. they will assemble at the St Levan Dockyard Gate, and after signing the indemnity forms will go for a trip in *Camel*, duty tug for the day. On returning they will be able to look over *Pert* before they leave for London at 4.15, to arrive at 9.5. The fare is £3 9s.

It is not only the full-size vessel which interests the Paddle Steamer Preservation Society. A recent meeting of the London and Home Counties Branch voted overwhelmingly for the forming of a models group—Mr H. C. Stone of Berry Fruit Farm, Bentley, Ipswich Suffolk has taken charge and to stimulate interest in building models the society plans to offer a prize for each new model of a paddle steamer shown at an exhibition. If possible, some of the members' work will be seen at the Model Engineer Exhibition in August.

Can we please, have enough paddle steamer models to form a separate class ?

Secretary, London and Home Counties area: Mr W. R. Horwood, 82 Kingswood Avenue, Bromley, Kent.

WELLING WINNERS

When the results of the Welling MES regatta arrive I expect to find the name of G. C. Caird of the Bromley MPBC featuring in it somewhere. This year it was at the top of the list in the steering event—not by a very large margin but by a mere point achieved after a re-run. Second place was taken by a lady, Mrs Washington of the Victoria MPBC. Mr R. Logan was third and Mr R. Hawes fourth; both belong to Blackheath MPBC.

In the nomination event the home team raced away to win. Mr C. A. Clark completed the competition with a nil per cent error. Congratulations, Mr Clark ! The second was R. Hawes of Blackheath MPBC who had a 2 per cent error.

There were 45 entries and competition was very keen.

Here are the points awarded in the steering event: 1, G. C. Caird, 16 pts plus 1 on a re-run; 2, Mrs Washington, 16 pts; 3, R. Logan 13 pts; 4, R. Hawes, 10 pts plus 3 on a re-run.

Secretary: Mr J. H. King, 309 Days Lane, Sidcup, Kent.

RALLY ROUND

June 17-18 Reversby Rally. *Traction engine rally at Reversby Abbey, Boston.*

June 17 Appleford Rally. *Rally at Appleford 3 miles SE of Abingdon, Berks.*

June 24 Northleach Rally. *Rally at Upper End Farm, Eastington, Northleach, Gloucester. Start at 2 p.m.*

July 1-2 Alton Towers Rally. *Rally at Alton Towers, 8 miles NW of Uttoxeter, Staffordshire. Organised by the North Staffs Traction Engine Club.*

July 1 Chatteris Rally. *Rally at Chatteris, Cambridge. Organised by the East Anglian Traction Engine Club.*

July 15-16 Rempstone Rally. *Rally at Rempstone, 30 miles NE of Loughborough.*

July 22 Redruth Rally. *Redruth is 9 miles SW of Truro, Cornwall.*

July 29 Kegworth Rally. *Rally at Kegworth, 5½ miles NW of Loughborough.*

July 29 Taunton Rally. *Rally at the County town of Somerset, Taunton, 44½ miles SW of Bristol.*

August 5-7 Woburn Rally. *Rally at the home of the Duke of Bedford, Woburn Abbey.*

August 7 Church Stretton Rally. *Traction engine rally at Church Stretton, which is 12¾ SW of Shrewsbury. Rally starts at 11 a.m.*

August 19 Weald of Kent Rally. *Rally organised by the Weald of Kent Traction Engine Club at Penshurst Aerodrome near Tonbridge, Kent.*

September 9 Kelvedon Rally. *Site is a mile along the main A12 from Kelvedon. Eastern National Omnibus Company buses pass the site.*

September 10 Basildon Rally. *Rally at the premises of Messrs Harold Wood at Basildon, Essex. Organised by the Historic Commercial Vehicle Club.*

CLUB DIARY

Dates must be sent at least four weeks before the event

June 15 Bristol SMEE. Meeting at the Games Room of the TWCA.

June 16 Rochdale SMEE. General meeting at Lea Hall, Smith Street, Rochdale.

June 17-18 City of Leeds SME. Track meeting at the track, Temple Newsam.

June 17-18 IRCMS. Annual radio-control regatta at Rick Pond, Hampton Court.

June 17-18 IRCMS and YM 6m. OA. Radio-control yacht regatta at the Rick Pond, Hampton Court.

June 17 North London SMEE. Welling SME visit Arkley.

June 17 Welling SME. Visit to North London SMEE at Arkley.

June 18 North London SMEE. Hitchin club visit Arkley.

June 18 Hitchin SME. Visit to North London SMEE at Arkley.

June 18 Malden SME. Locomotive trials at Claygate Lane.

June 18 York City MES. Public day at Rechabite Buildings, Clifford Street.

June 18 Norwich and District SME. Track meet at Eaton Park.

June 18 Birmingham SMEE. Visit to Brighouse and Halifax SME.

June 18 Birmingham SME. Invitation to the Brighouse SMEE at Ravensprings Park, Brighouse.

June 18 Victoria MPBC. Regatta at Victoria Park. SR and SP only.

June 18 Mortlake MPBC. Regatta at Mortlake. RC only.

June 18 Brighton MPBC. Regatta at Hove Lagoon. RC only.

June 18 Brighouse and Halifax SMEE. Club open day at Ravensprings Park, Cawcliffe Road, Brighouse.

June 19 Warrington and District MES. Meeting at the Earlestown track.

June 19 Leicester SME. Bring and buy evening at Alhey Park.

June 19 Wigan MES. Meeting at St Michael's Institute, Earl Street, Swinley, Wigan.

June 20 City of Leeds SME. Track meeting at the track, Temple Newsam.

June 21 Blackpool SME. Meeting at Marston Working Men's Club at 7.30 p.m.

June 21 Harrow and Wembley SME. Locomotive section meet at Headstone Lane, at 8 p.m.

June 22-24 17th National Threshers' Reunion Rally at Williams County Fairgrounds on Alt. US 20, Montpelier, Ohio, USA.

June 23 City of Leeds SME. Erection of the portable track at Crompton Parkinson Ltd at Guiseley.

Advertisements, with remittance, should be sent to Classified Advertisement Department, Model Engineer, 19-20, Noel Street, London, W1, by latest Thursday morning prior to date of publication. Advertisements will be accepted from recognised sources by telephone. GERRARD 8811. Ex. 31.

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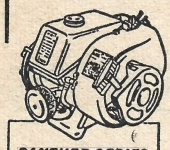

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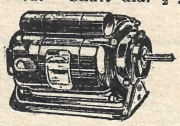

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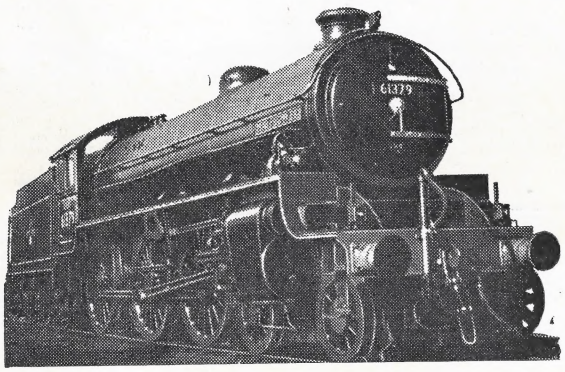

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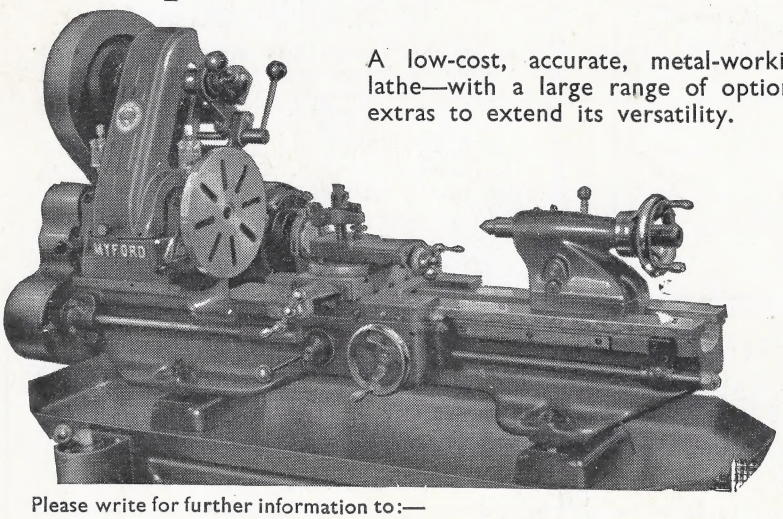

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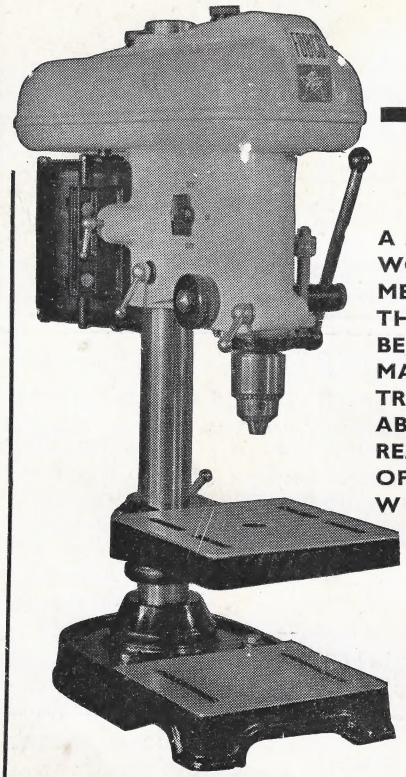

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